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A
SYSTEM
OF
SURGERY.

BY

BENJAMIN BELL,

Member of the Royal College of Surgeons of
Edinburgh, and one of the Surgeons to
the Royal Infirmary of that City.

ILLUSTRATED WITH COPPERPLATES.

VOLUME I.

EDINBURGH:

Printed for CHARLES ELLIOT, Edinburgh;
and G. ROBINSON, London.

M,DCCLXXXIII.

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TO

ALEXANDER MONRO, M. D.

Preſident of the Royal College of Phyſicians, and
Profeſſor of Medicine, Anatomy, and Surgery,
in the Univerſity of EDINBURGH.

SIR,

THE chair you have ſo long and ſo ably filled in this Univerſity, and the rank you hold in your profeſſion, point you out as a fit patron of ſuch attempts as are made by your countrymen, for the improvement of the Art of Surgery.

But I am actuated by another motive when I addreſs you on this occaſion. For, having commenced the ſtudy of anatomy under your auſpices, I conſider myſelf as in-

debted

debted to you in a particular manner, for any anatomical knowledge of which I am poſſeſſed. I have therefore to deſire, that you will accept of this public teſtimony of my gratitude; and, if this Firſt Volume of a Syſtem of Surgery, merits any ſhare of your approbation, may I requeſt, as an additional obligation, the favour of that protection, which your countenance will be ſure to afford it? I remain, very reſpectfully,

SIR,

Your obedient humble ſervant,

BENJAMIN BELL.

EDIN. NOV.
1782.

PREFACE.

SOME years ago I publiſhed a Volume of Obſervations on different parts of Surgery; and the indulgent reception with which it was favoured, has encouraged me to lay another volume before the Public: This, as well as the former, is intended as part of a work, which, when completed, will form a general Syſtem of Modern Surgery.

In announcing an undertaking ſo arduous and ſo extenſive, it may be proper to explain the reaſons which induced me to enter upon it, and to point out the plan upon which I intend to proceed.

The learned and judicious Heiſter publiſhed the laſt edition of his Syſtem of Surgery ſo long ago as the year 1739. In this work, the author comprehends whatever the experience of former times had approved as uſeful; and adds ſuch obſervations as his own knowledge in Anatomy and practice in Surgery ſuggeſted.

This was the firſt, and it ſtill remains the only complete Syſtem of Surgery of which we are poſſeſſed.

Since this publication of Heiſter's, many valuable diſcoveries and important improvements have been introduced; and the Public has at different times been favoured with accounts of them by their reſpective authors. But theſe publications treat of various ſubjects, and are all neceſſarily unconnected with each other; ſo that the additional knowledge with which our art has been of late enriched, lies in a very diffuſed, and to many perhaps in an inacceſſible, ſituation.

It is true, that ſome attempts have been made towards a full ſyſtematic arrangement of chirurgical ſubjects. Platner publiſhed his Inſtitutes of Surgery in the year 1745; and Ludwig favoured the world with a ſimilar publication in 1767. But both theſe works may be properly conſidered as heads of lectures which were read by thoſe celebrated profeſſors at Leipſic; and although poſſeſſed of much merit, they are too conciſe to give a clear and diſtinct idea of the various topics of which they treat.

In conſequence of this, the young ſtudent in the art, as well as the intelligent practitioner who is deſirous of information, is obliged to conſult a great variety of publications, which he frequently finds much difficulty in procuring, and which his other occupations will not always allow him ſufficient time to peruſe.

Induced by theſe conſiderations, and having frequently experienced much inconvenience from the want of a well-digeſted Syſtem of Surgery, I have been led to attempt the preſent work: Which, though it may not afford much new information to practitioners of experience and reflection, who are accuſtomed to peruſe every publication that appears; yet to the younger part of the profeſſion, and to all thoſe whoſe opportunities of acquiring knowledge have not been conſiderable, I flatter myſelf it may prove very ſerviceable.

My deſign is, to exhibit a view of the art of Surgery, as it is at preſent practiſed by the moſt expert ſurgeons in Europe, as far at leaſt as my own obſervation in the courſe of attending different Hoſpitals, joined to the advantages of reading and correſpondence, have enabled me to do ſo.

It may be proper to remark, that a number of improvements ſuggeſted at different times in various parts of Surgery, are here purpoſely omitted. Within theſe laſt thirty or forty years, ſuch a rage has prevailed for the invention of new inſtruments, that it has become faſhionable to accompany every publication with ſomething new and ſingular of this kind. Some of theſe have undoubtedly been productive of much advantage: But the greateſt part of them tend more to evince the ingenuity of their authors, than to render the operations for which they were intended, more eaſily accompliſhed; for, although facility in performance is one great object in every ſurgical operation, yet the ends we have in view are in general attained by very ſimple means.

Indeed, one object of the preſent publication, is, an endeavour to diveſt the art of all that uſeleſs machinery with which it has been encumbered; and to retain only what appears evidently to reſt upon the ſolid baſis of experience. I have therefore been particularly attentive, in admitting nothing which I have not myſelf found confirmed by trial, or which I have not known to prove uſeful in the hands of others.

My connection with a large hoſpital, the Royal Infirmary of Edinburgh, to which the greateſt part of the poor in Scotland requiring the aſſiſtance of chirurgical operations, are accuſtomed to reſort, together with that private practice which has fallen to my ſhare, have given me opportunities, both of repeatedly performing every operation myſelf, and of being frequently preſent when they were performed by ſome of the moſt expert ſurgeons of this place; a circumſtance which enables me to ſpeak with ſome degree of confidence, though, I hope, with due caution, of each. Without ſuch advantages, I ſhould not have thought my-

myſelf juſtifiable in undertaking the preſent Work; for it is chiefly by hoſpital practice that any individual can acquire ſuch experience in the great variety of chirurgical operations, as to be able to form any accurate ideas concerning them.

It is not propoſed in the courſe of the following Work, to attempt a particular ſyſtematic arrangement of the ſubjects of which it treats. Arrangements of this kind have indeed been employed with advantage in different branches of ſcience: The ſtudy of Natural Hiſtory has been much facilitated by their means; and a knowledge of the more general diſeaſes to which the human body is liable, is perhaps acquired with more eaſe by the comprehenſive views which a well digeſted noſological ſyſtem gives of them. But, as diſorders of every kind requiring the aſſiſtance of the operative part of Surgery, are perfectly local, and unconnected with one another by means of ſymptoms common to each; and as it ſeldom happens, that there is much ſimilarity in the means neceſſary for the removal of ſuch diſeaſes; the parade of claſſification under ſuch circumſtances, although it may ſerve to diſplay the fancy of an author, can have no effect either in rendering the ſtudy of Surgery more eaſy, or the practice of it more attainable.

Yet when one ſubject is naturally connected with another, I ſhall not any-where attempt to ſeparate them; and when the deſcription of any operation can be more eaſily underſtood from what has been ſaid concerning another, I ſhall conſider them in immediate ſucceſſion: But, in other inſtances, where no connection can be traced between the different articles treated of, no methodical arrangement can be with advantage attempted.

Were I to endeavour to trace the ſucceſſive improvements which have been made in ſurgery within theſe laſt fifty or ſixty years, I ſhould often find it difficult, and ſometimes impoſſible, to determine by whom the practice, as it is now eſtabliſhed, was introduced; and in order to give a fair account of the progreſs of the different operations of ſurgery, from their rude to their improved ſtate, I ſhould be under the neceſſity of entering into a full chronological hiſtory of each. While inquiries of this kind could ſerve no uſeful purpoſe, they would tend to render more prolix a work, which, from the variety of its ſubjects, muſt neceſſarily extend to a great length. I ſhall therefore in general decline them. On ſome occaſions, however, when the author of any remarkable improvement is known with certainty, I ſhall not fail to give him all the credit which his diſcovery ſeems to merit.

Such of my readers as are fond of theoretical diſquiſitions, will, I am afraid, be frequently diſappointed. When the ſubject under conſideration can be rendered more clear and intelligible by it, I have occaſionally employed ſuch reaſoning as experience and common ſenſe ſeem evidently to ſupport; but I have every-where ſtudiouſly guarded againſt entering on the diſcuſſion of doubtful and ſpeculative opinions.

In conſidering the different ſubjects, the appearance or ſymptoms of the diſorder—the uſual cauſes known to induce it—its probable conſequences—and the beſt method of treatment—are particularly deſcribed in ſucceſſion; and when an operation of importance is to take place, the parts which lie contiguous, but which the operator ought to avoid, are pointed out, as well as thoſe which he is under a neceſſity of dividing.

In deſcribing the different operations, I have uniformly adhered to the method at preſent practiſed by the beſt ſurgeons, excepting in ſuch inſtances where improvements of my own are propoſed; and none of theſe are any-where recommended, the utility of which has not been aſcertained by repeated trials.

In a work of this nature, it muſt unavoidably happen, that on ſeveral occaſions I differ in opinion from various reſpectable authors; but whereever I do ſo, no other motive, I hope, will appear for it, than a wiſh to render more perfect, an art which I am attempting to deſcribe and illuſtrate.

I am fully aware of the difficulties to be encountered in carrying on and completing this deſign; and am ſo diffident of my abilities to do juſtice to the undertaking, that, even after a conſiderable part of the materials are prepared, I have choſen this mode of publiſhing it in ſeparate volumes, that I may thereby have an opportunity, of diſcovering the ſentiments of the public, with regard to its merit and utility; a circumſtance, by which I will be in a great meaſure determined in the farther execution of my plan.

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A
TREATISE
ON THE
THEORY AND PRACTICE
OF
SURGERY.

CHAPTER I.

Of SUTURES.

SECTION I.

Of Sutures in general.

AS ſutures of one kind or another are found neceſſary, not only in every large wound, but in almoſt every operation of importance, the conſideration of

this

this ſubject ſeems firſt to require our attention.

A variety of ſutures have been practiſed by ſurgeons, each of which has from long experience been applied to a particular purpoſe, *viz.* the interrupted ſuture; the quilled ſuture; the glover's, and the twiſted ſuture. Many others are enumerated by ancient writers; but the four now mentioned are the only ſpecies of ſutures at preſent in ordinary uſe; and even of theſe, ſome, we think, might with propriety be omitted.

The intention of every ſuture, is to unite parts, which either by accident or deſign have been divided. Another mode of effecting this, is through the intervention of adheſive plaſters; and this by ſurgeons has been termed the falſe or dry ſuture; in oppoſition to the others performed by the needle, which are denominated the true or bloody ſuture.—But as the conſideration of this ſubject, *viz.* the uſe of adheſive plaſters in wounds, will be more properly introduced in a ſubſequent part of this work, we ſhall not in this place enter upon its diſcuſſion.

SECTION II.

Of the Interrupted Suture.

IN deep wounds, when a reunion of the divided parts is intended, this is the ſuture to which we generally have recourſe; but from what will be afterwards more fully explained when treating of wounds, and from what will preſently farther appear, it does not ſeem to be ſo well adapted to this purpoſe as the twiſted ſuture. When it is determined, however, to make trial of the interrupted ſuture, the following is the eaſieſt mode of doing it.

In every wound where ſutures are found neceſſary for the retention of parts, it has commonly been conſidered as good practice, to carry the needle and ligature to the bottom of the ſore, ſo as to afford as little chance as poſſible of matter collecting underneath; and the uſual mode of effecting this, is by introducing the needle from without inwards, and again from the bottom of the wound to the ſame diſtance on the oppoſite ſide. But this ſuture, it may be remarked, is much more neatly, and at the ſame time more eaſily performed, by paſſing both ends of the thread from within outwards; which is readily done by uſing two needles upon each thread, inſtead of one. A needle being put upon each end of the ſame thread, and each needle being inſerted at the bottom of the ſore, and puſhed outwardly ſo as to paſs out at a proper diſtance from the edge of the wound, the needles are then to be taken off, and the threads allowed to remain till all the ligatures are paſſed which the extent of ſore ſeems to require.

The number of ligatures neceſſary for any wound, muſt in a great meaſure depend upon the extent of divided parts. By authors in general it has been laid down as an eſtabliſhed rule, that one ſuture is fully ſufficient for every inch of wound. It will frequently indeed happen, that this number is found ſufficient; but in ſome inſtances, particularly where muſcular parts are deeply cut tranſverſely, and where conſequently a great degree of retraction occurs, a greater number of ſtitches are neceſſary: Whenever a number of angles, too, occur in a wound, more ligatures are required than in a ſtraight wound of the ſame extent; for, at every angle, however inconſiderable it may be, there ought to be a ſuture.

In paſſing the ligatures, great care is neceſſary to pierce the ſkin at a ſufficient diſtance from the edge of the wound; for, if they do not comprehend a thickneſs of parts in ſome meaſure proportioned to the depth of the wound, and to the extent of retraction to be expected, they will very readily cut through the parts entirely.—By ſome authors we are directed to paſs the ligatures, at nearly the ſame diſtance from the edges of the ſore, as the wound is of depth. This rule, however, will by no means be found to anſwer in practice. Thus, in a very deep wound, for inſtance of three inches or ſo, no neceſſity can occur for carrying the ligatures three inches from the edges of the ſore; and again, in very ſuperficial cuts, it ſometimes happens that the ligature ought to be paſſed out at a greater diſtance from the edges of the wound than the ſore is of depth. It ought not, in almoſt any caſe, to be leſs than half an inch from the edge of the ſore; and it will ſeldom happen, even in the largeſt wounds, that an inch is not found to be a ſufficient diſtance.

It will be readily underſtood, that the ſtrength of the ligature and ſize of needle ought always to be proportioned to the depth of the ſore and retraction of parts. The ſeveral ſizes of needles, as repreſented in Plate I. are of the various dimenſions found neceſſary in practice; and the ligatures to be uſed along with them ought to be ſuch as nearly, though not entirely, to fill the eyes of the different needles. In order to make the ligatures paſs more eaſily, to render them more durable, and at the ſame time to make them more ſuſceptible of a flattened form,

Plate I.

Fig. 1.

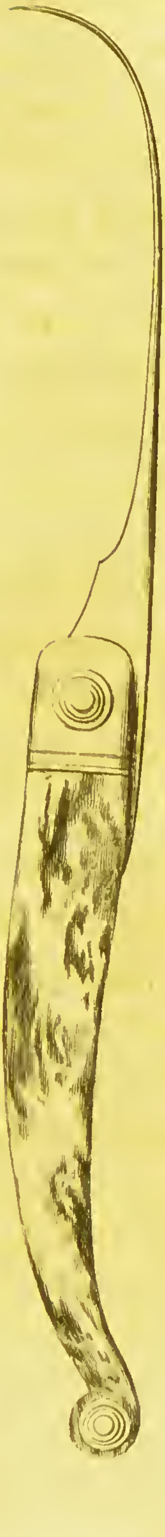


Fig. 2.

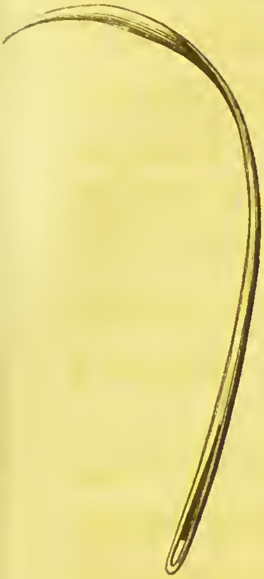


Fig. 3.

Fig. 4.

Fig. 5.

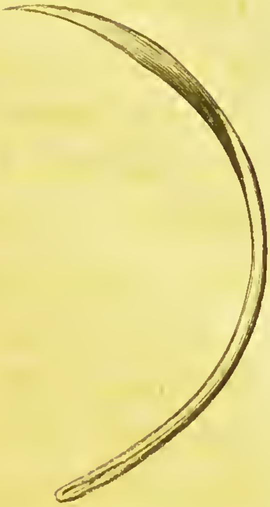


Fig. 6.

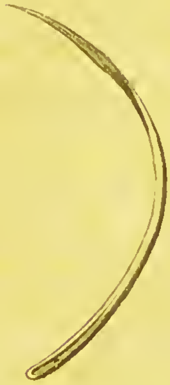


Fig. 7.

A. Bell sculp.t

form, which does not ſo readily cut thro' the contained parts as a round one, they ought all to be well-covered with fine bees-wax.

So ſoon as the threads are all paſſed, the lips of the wound ought to be preſſed together and ſupported by an aſſiſtant till all the ligatures are firmly tied; beginning either in the middle of the wound, or at one end, as the operator inclines. In tying the knots, it is uſual to paſs the ends of the threads twice through the firſt nooſe, in order to prevent their yielding; and when this is done, it is alleged by ſome that there is no neceſſity for more than one knot upon each ligature; but as two knots are very eaſily made, and as every chance of their yielding is thereby effectually prevented, this precaution ought never to be omitted. It is a practice with ſome ſurgeons to inſert a piece of lint between the firſt and ſecond knots, or between the firſt knot and the ſkin below, in order to ſave the parts underneath from the preſſure of the knots; but as in reality all ſuch means of protection afford no advantage of importance, and as they prevent the knots from being made with exactneſs, they ought therefore to be laid entirely aſide.

By ſome writers on this ſubject, we are deſired not to bring the knots of ligatures immediately upon the edges of the wound, but rather to carry them to one ſide, over upon the ſound teguments: but whoever has tried both methods, will at once be ſenſible, that this is by no means an improvement; for in no other way can both ſides of the ſore be equally ſupported, but by the knots being paſſed immediately above the lips of the divided parts.

SECTION III.

Of the Quilled Suture.

AS the quilled ſuture is ſtill retained by ſome practitioners, it is here thought neceſſary to deſcribe the mode of performing it.

In deep wounds attended with much retraction, it is always a neceſſary precaution, to aſſiſt the operation of the ligatures, by means of bandages ſo applied as to afford as much ſupport as poſſible to the divided parts: But, even with every aſſiſtance of this nature, it now and then happens, that the divided parts cannot be kept together, retraction occurs to a greater or leſſer degree, and the ligatures of courſe cut aſunder the ſoft parts they were at firſt made to ſurround.

With a view to prevent this receding of the teguments and other parts, it was long ago propoſed to add to the interrupted ſuture what was ſuppoſed would afford an additional ſupport; *viz.* quills, or pieces of plaſter rolled up into the form of quills, one of which being placed on each ſide of the wound, the double of the ligature is made to include the one, and the knot to preſs directly upon the other, inſtead of being made immediately on the edges of the ſore as was directed for interrupted ſutures.

It is at once evident, however, that the ligatures muſt here make the ſame degree of preſſure on the parts through which they paſs, as they do in the interrupted ſuture; and this being the caſe, it is equally obvious, that the interpoſition of theſe ſubſtances cannot be of any uſe. This ſuture is accordingly now very rarely practiſed, and it is probable that it will be ſoon laid entirely aſide.

SECTION IV.

Of the Glover's Suture.

THIS ſuture is termed the Glover's from being the one in common uſe among that ſet of people. As it is exceedingly ſimple, and very univerſally known, it does not here merit much deſcription: We ſhall therefore juſt ſhortly obſerve, that it conſiſts in a ſeries of ſtitches all connected with one another, and continued in an oblique ſpiral direction along the courſe of the divided parts intended by it to be kept together.

This ſuture has hitherto been univerſally employed for reuniting ſuch parts of the inteſtines as have been divided by wounds: but, when treating of accidents of this kind, I ſhall endeavour to ſhow, that the ſame end may be more perfectly attained, and probably with leſs danger, by means of the interrupted ſuture; ſo that as this ſuture has almoſt never been applied to any other purpoſe, it will likewiſe in all probability ſoon fall into diſuſe.

SECTION V.

Of the Twiſted Suture.

BY the term twiſted ſuture is meant, that ſpecies of ligature, by which, parts either naturally or artificially ſeparated, are united together, by means of ſtrong threads properly twiſted round pins or needles puſhed through the edges of the divided parts.

This ſuture is commonly employed for the purpoſe of uniting the parts in caſes of hare-lip; and this indeed is almoſt the only uſe to which it has been hitherto applied:

But we may here remark, that it may with great advantage be put in practice in a variety of other caſes, particularly in all artificial or accidental diviſions either of the lips or cheeks; and, in every wound in other parts that does not run deep and in which ſutures are neceſſary, this ſuture is preferable to the interrupted or any other.

In very deep wounds, for inſtance in all wounds extending to a greater depth than an inch and half, the interrupted ſuture is the only one that is admiſſible; for, in all ſuch deep cuts, the pins neceſſary in the twiſted ſuture cannot with propriety be employed, as they cannot be introduced to ſuch a depth, and afterwards ſo twiſted with ligatures as to reunite the divided parts, but with great pain to the patient. In ſuch wounds, therefore, we muſt of neceſſity have recourſe to the interrupted ſuture: But it may be here remarked, that wounds of this depth requiring the aid of ſutures, are very rarely met with; ſo that, in by much the greateſt proportion of wounds where ſutures are adviſable, the twiſted ſuture will be found practicable; and whenever it is ſo, it ought certainly to be preferred to every other, as being obviouſly better calculated, even than the interrupted ſuture, for the retention of divided parts. The pins made uſe of for twiſting the threads upon, ought to be made of a flat form, ſo as not to cut the parts through which they paſs, ſo readily as the ligatures employed in the interrupted ſuture: And thus one great objection to the latter is very effectually obviated; for, every practitioner muſt be ſenſible of this being the moſt faulty part of the interrupted ſuture, that when muſcular parts are divided, ſo as to produce much retraction, the ligatures employed for retaining them, almoſt conſtantly cut them thro' before a reunion is accompliſhed; whereas, the flatneſs of the pins uſed in the twiſted ſuture, and upon which, it may be remarked, the whole preſſure produced by the ligatures is made to reſt, proves in general a very effectual preventative againſt all ſuch occurrences.

The pins uſed in this operation, have commonly been made of ſilver; and, in order to make them paſs with greater eaſe, ſteel points have been added to them. As gold pins, however, are capable of receiving a ſufficient degree of ſharpneſs, which renders the intervention of ſteel points quite unneceſſary; and as gold is fully more cleanly than ſilver, from its not acquiring ſo readily that kind of cruſt which immerſion in fluids is apt to produce upon the other, pins of this metal are therefore preferable.

The form and ſize of pins as repreſented in Plate II. is what from experience has been found to be the moſt uſeful for every ordinary purpoſe; but, for particular uſes, the ſize muſt no doubt be ſubject to variations.

The manner of performing this operation is as follows. The divided parts intended to be reunited, muſt by the hands of an aſſiſtant be brought nearly into contact; leaving juſt as much ſpace between the edges of the ſore, as to allow the ſurgeon to ſee that the pins are carried to a proper depth. This being done, one of the pins muſt be introduced through both ſides of the wound, by entering it on one ſide externally, puſhing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it outwardly through the oppoſite ſide, to the ſame diſtance from the edge of the ſore that it was made to enter at on the other.

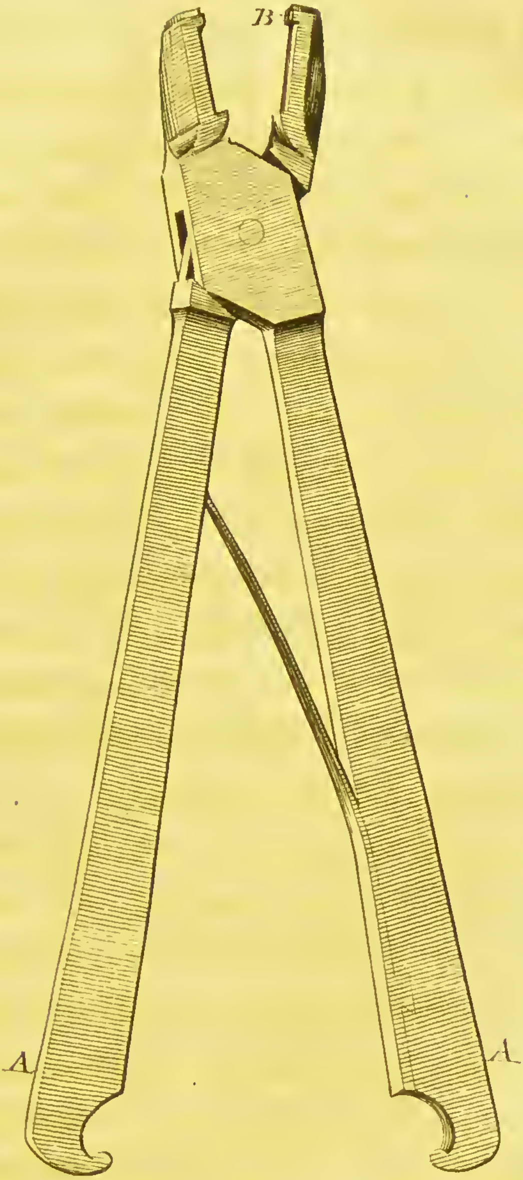
The diſtance at which the needle ought to enter from the edge of the ſore, muſt be determined by the depth of the wound, and by the degree of retraction produced in the divided parts. In general, however, it is a proper regulation in deep wounds, to carry the pins nearly to the ſame diſtance from the ſide of the ſore, as they are made to penetrate in depth: And it may be alſo remarked, that, whatever the deepneſs of the wound may be, the pins ought to paſs within a very little of its bottom; otherwiſe the parts which lie deep will run a riſk of not being united, a circumſtance which muſt always give riſe to troubleſome collections of matter.

In paſſing the pins through the different ſides of the wound, if the ſkin and other teguments are not more firm than ordinary, it may commonly be done by the fingers alone, and particularly if the pins are made with ſmall heads or knobs for the fingers to preſs upon; but when, from firmneſs of parts and other circumſtances, much difficulty is expected to the entrance of the pins, the inſtrument termed Porte-aiguille very effectually removes this inconvenience.—In Plate II. is repreſented the moſt convenient form of this inſtrument that has yet been invented.

The firſt pin being paſſed in this manner very near to one end of the ſore, and the parts being ſtill ſupported by an aſſiſtant, the ſurgeon, by means of a firm waxed ligature, paſſed three or four times round and acroſs the pin, ſo as nearly to deſcribe the figure of 8, is to draw the parts through which it has paſſed, into immediate and cloſe contact: and the thread being now

Plate II.

Fig. 1.



ig. 2.

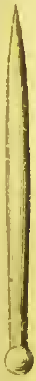


Fig. 5.

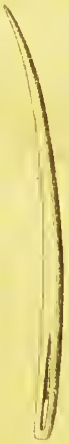


Fig. 3.

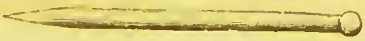
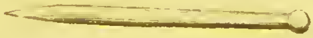


Fig. 4.



A. Bell sculpt.

now ſecured with a looſe knot, another pin muſt be introduced in the ſame manner at a proper diſtance from the former; and the thread with which the other was fixed, being looſed, and in the ſame manner carried round this pin, others muſt be introduced at proper diſtances along the whole courſe of the wound, and the ſame ligature ought to be of a ſufficient length for ſecuring the whole.

The number of pins to be uſed, muſt be determined entirely by the extent of the wound. Whenever this ſuture, however, is practiſed, whether the wound be large or of very ſmall extent, a pin ought to be introduced very near to each end of it, otherwiſe the extremities of the ſore are apt to ſeparate ſo as not to be afterwards eaſily reunited. In large wounds, if the pins are introduced at the diſtance of three quarters of an inch from one another, it will in general be found ſufficient; but, in cuts of ſmaller extent, a greater number of pins become neceſſary in proportion to the dimenſions of the ſores.

Thus, in a wound of an inch and half in length, three pins are abſolutely requiſite; one near to each end, and another in the middle of the ſore: Whereas, five pins will always be found fully ſufficient for a wound of three inches and a half in extent, allowing one to be within a quarter of an inch of each extremity of the wound, and the others to be placed along the courſe of the ſore at the diſtance of three quarters of an inch from one another.

The pins being all introduced and ſecured in the manner directed, nothing remains to be done, but to apply a piece of lint wet with mucilage, all along the courſe of the wound, with a view to exclude as effectually as poſſible every acceſs to the external air.

In order to prevent the ends of the pins from preſſing upon and hurting the ſkin below, it is uſual to apply a ſmall bolſter of linen or charpie under each of them; but as this always does miſchief, by tending to preſs upon the pins, ſo as to force them to act upon the ſoft parts thro' which they have paſſed, every thing of this kind ought to be omitted. When, however, the patient happens to complain of being hurt by the ends of the pins, this may be eaſily prevented, by introducing between them and the ſkin pieces of thin linen ſpread with any adheſive plaſter.

In order to give every chance of ſucceſs to this operation, it has been commonly adviſed, immediately after the pins are ſecured, to apply the uniting bandage over the whole, ſo as to afford as much ſupport as poſſible to the contiguous parts. The leaſt reflection, however, renders it evident, that every degree of preſſure made in this manner muſt do miſchief; for, the bandage being made to reſt immediately upon the pins, a conſiderable degree of pain and conſequent inflammation muſt of courſe be produced by it: And in fact this is ſo much the caſe, that, in every inſtance in which I have ſeen this bandage applied, it either did harm, by exciting inflammation in conſequence of too much preſſure upon the pins; or, if that effect was not produced, no advantage was received from it, from the bandage not being applied with ſuch tightneſs as to afford any ſupport whatever to the parts below.

The next point to be determined, is, the time the pins ſhould be allowed to remain. When they remain long, they generally do harm, by the unneceſſary irritation and conſequent retraction of parts with which they are always attended; and again, if they are not continued for a ſufficient length of time, that degree of adheſion is not produced between the divided parts that is neceſſary for their future retention, ſo that the effect of the operation comes to be in a great meaſure, if not entirely, loſt.

In wounds of no great depth, for inſtance of three quarters of an inch or ſo, a ſufficient degree of adheſion always takes place in the ſpace of five days; and ſix, or at moſt ſeven days, will generally be found ſufficient for wounds of the greateſt depth. But with reſpect to this circumſtance, it muſt always be underſtood, that the patient's ſtate of health muſt have a conſiderable influence on the time neceſſary for producing adheſion between divided parts. In ſpecifying the time neceſſary for this purpoſe, the operation is ſuppoſed to have been done on a conſtitution in a ſtate of perfect health. When the patient labours under ſcurvy, or any diſorder which affects the general ſyſtem, it is impoſſible to aſcertain this circumſtance with preciſion: In ſuch caſes we muſt be determined by the nature and ſtate of the diſeaſe preſent at the time.

So ſoon as the pins are withdrawn, the uniting bandage may be then applied with great advantage in order to ſerve as a ſupport to the parts newly united; but, as ſlips of leather ſpread with ordinary glue, when applied to each ſide of the cicatrix, may, by means of ligatures properly connected with them, be made to anſwer this purpoſe in a more effectual manner, this mode of ſupporting the parts ought of courſe to be preferred[*].

As the twiſted ſuture when properly

performed

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[*] Figures of parts united in this manner, will be repreſented when we come to treat of the Hare-Lip.

performed is a very neat operation, as its conſequences are in general of importance, and as it may with much advantage be made to ſuperſede the uſe of almoſt every ſuture, a few inſtances only excepted, I therefore thought it proper to conſider it with more attention than has hitherto been commonly beſtowed upon it.

EXPLANATION *of* PLATE I.

Fig. 1. A form of hook, commonly termed a tenaculum, for the purpoſe of pulling out bleeding veſſels to be tied by ligatures.

Fig. 2. and 3. Two needles of a different curve from thoſe in ordinary uſe. The curvatures being altogether on their fore-parts, and the handles perfectly ſtraight, they are thereby more eaſily managed than the others, particularly in deep wounds. Fig. 5. and 6. repreſent two needles of the uſual form; but neither theſe nor the other two have an edge on their concave parts. They are made ſomewhat round like a lancet, both on their convex and concave ſides;

which adds to their ſtrength, and makes them enter with more eaſe than the others. I have long made uſe of thoſe needles, and whoever employs them will find them preferable in every reſpect to the others.

Fig. 4. and 7. Two ſtraight needles for ſutures of the inteſtines and other delicate membranous parts.

All theſe needles are repreſented of the full ſize.

A number of inſtruments have been contrived for holding the needles when they are to be employed in deep wounds. The Port-aiguille repreſented in Plate II. will anſwer this purpoſe as well as any other; but inſtruments of this kind cannot be often needed.

EXPLANATION *of* PLATE II.

Fig. 1. A Porte-aiguille mentioned in p. 16.

A. A. The handles of the inſtrument.

B. A groove for receiving the pins uſed in the twiſted ſuture.

This inſtrument is commonly made with a ſlider for fixing the handles after the pins are inſerted into the groove; but as this always proves troubleſome to the operator, and is not in any degree neceſſary, it is here purpoſely omitted.

Fig. 2. 3. and 4. are different ſizes of pins uſed in the twiſted ſuture deſcribed p. 13.

And fig. 5. is a flat needle ſometimes found uſeful in ſtitching blood-veſſels that lie between contiguous bones.

All the inſtruments in this plate are repreſented of their full ſize.

CHAP. II.

Of the LIGATURE *of* ARTERIES, *and other means employed by art for putting a ſtop to* HÆMORRHAGIES.

IN every ſpecies of wound, whether accidentally produced, or effected by the hands of a ſurgeon, the firſt circumſtance to be attended to, is the degree of hæmorrhagy that takes place. In all ſuch occurrences, the blood is diſcharged, either from one or more large arteries; or, is produced by a general oozing from the ſmaller veſſels over the ſurface of the ſore: To the former of theſe cauſes we ſhall firſt attend, and ſhall afterwards proceed to the conſideration of the latter.

A ſurgeon being called to a perſon loſing much blood from the diviſion of any of the larger veſſels, the firſt ſtep to be taken, is, by means of ſtrong compreſſion, to effect a temporary ſtoppage of the diſcharge, till by the application of ligatures a more effectual remedy is obtained. In the head, as well as in the trunk of the body, the eaſieſt method of applying preſſure of this kind, is, by means of doſſils of linen or charpie, held firmly upon the mouths of the bleeding veſſels, either by the hands of an aſſiſtant, or by the uſe of a proper bandage: Or, when preſſure can be effectually applied to the ſuperior part of the artery, it anſwers better; as it not only ſecures the veſſel equally well, but admits of the neceſſary ligature being applied with greater freedom.

When, again, accidents of this nature occur in any of the extremities, and where preſſure can be made with eaſe on the ſuperior parts of arteries, for ſuch caſes we are in poſſeſſion of a remedy, which, when ſkillfully applied, never fails of producing an immediate ſtop to all farther loſs of blood. What is here meant, is, the Tourniquet.

Till the invention of this inſtrument, which was not known till laſt century, Surgery remained in a deplorable ſtate indeed. No operation of importance could be undertaken on any of the extremities but with great hazard to the patient; and the effects of large wounds muſt frequently have proved mortal, from the want of this aſſiſtance, which otherwiſe might not have been in any degree hazardous.

As the invention of the tourniquet is claimed by different people, and even by different nations, we ſhall not here pretend to ſay from whence it originally came: but whoever had the merit of it, the firſt inſtrument of this kind with which the world was made acquainted, was exceedingly ſimple; ſo much ſo, indeed, that we now reflect with aſtoniſhment at the diſcovery having been reſerved to ſuch a very late period. A ſmall cuſhion being placed upon the courſe of the principal artery of a limb, a circular rope or bandage was made to paſs twice round it; and a ſmall timber handle being then introduced between one of the folds of the bandage, for the purpoſe of twiſting it, the cuſhion by theſe means was preſſed with ſo much force upon the artery, as to put an effectual ſtop to the courſe of the blood through the under part of the limb.

Mr Petit, an eminent ſurgeon of Paris, was the firſt who propoſed a conſiderable improvement on this inſtrument, by connecting the circular bandage with a ſcrew, which was ſo contrived as to produce the preſſure chiefly on the principal arteries, without materially affecting the reſt of the limb. It had this advantage over the other inſtrument, that the operator himſelf could manage it, without being under the neceſſity of employing an aſſiſtant; but it was liable to one great inconvenience from the very circumſtance which by the inventor was conſidered as an improvement. This inſtrument of Mr Petit being made to act upon the principal arteries only, the ſmaller veſſels communicating with theſe, by not being properly compreſſed, diſcharge blood freely from the inſtant they are cut; and as this proves a very troubleſome circumſtance in the courſe of operations, different improvements have of late been made upon it. The pattern in Plate III. is the reſult of all of theſe.

By means of this inſtrument in its now improved ſtate, the blood in any limb is very eaſily and effectually commanded; and as it graſps the whole member equally, all the collateral branches as well as the principal arteries are equally compreſſed by it. It has this material advantage, too, over every other inſtrument of this kind, that, when properly applied, a ſingle turn, or even half a turn of the ſcrew, is ſufficient for producing either a flow of blood, or

Plate III.

Fig. 1.

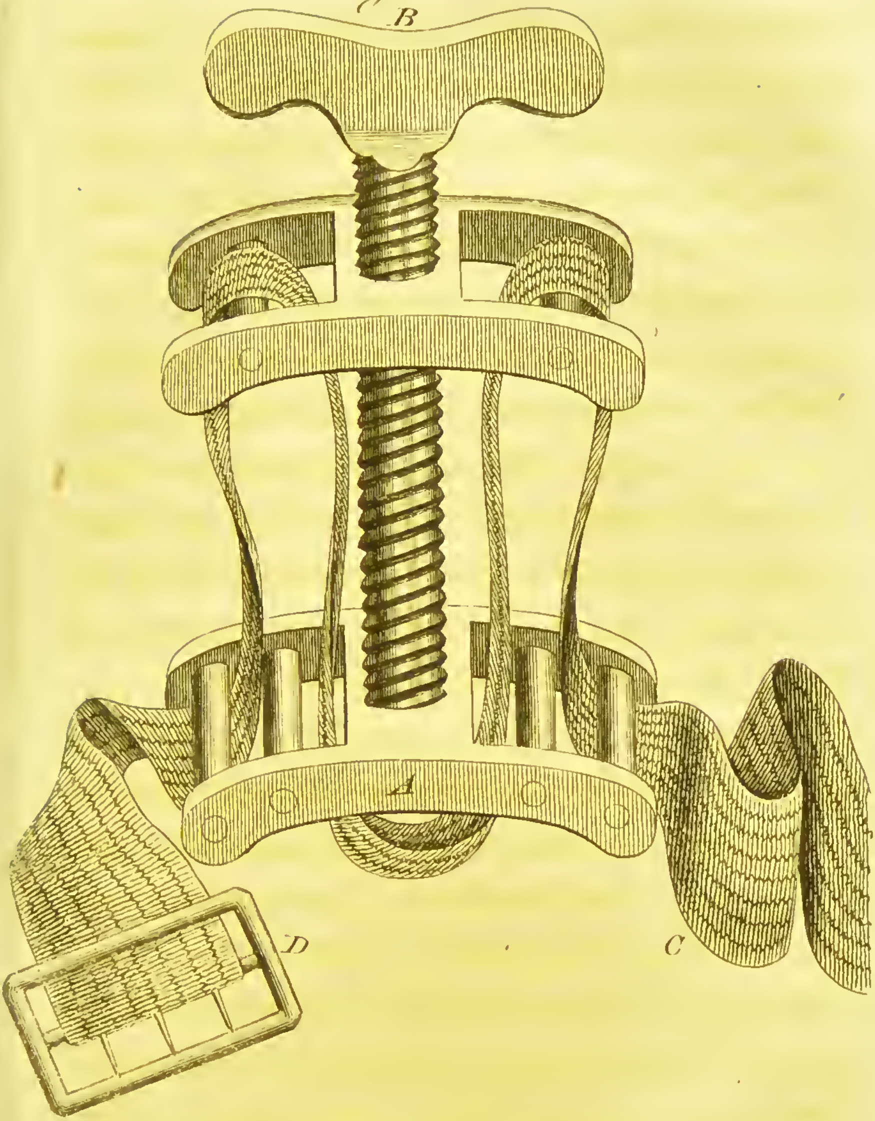
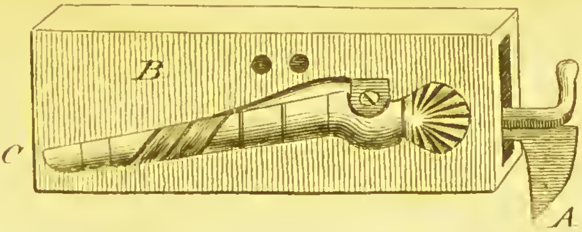


Fig. 2.



A. Bell Sculp.t

for putting a total ſtop to it.—The manner of uſing it is this.

Let a cuſhion of three inches in length by one inch and half in diameter be prepared of a linen roller, and be made tolerably firm but yet not ſo hard as to render preſſure produced by it very painful: This being placed upon the courſe of the principal artery of the limb, is to be firmly ſecured in that ſituation by one or two turns of a circular roller, of the ſame breadth with the cuſhion itſelf.

The inſtrument A, with the ſtrap connected with it, being now placed upon the limb, with the handle of the ſcrew B on the oppoſite ſide of the member to the cuſhion upon the artery, the ſtrap C is to be carried round the limb directly over the cuſhion, and to be firmly connected on the other ſide to the buckle D. In thus connecting the ſtrap and buckle together, particular attention is neceſſary in doing it with great firmneſs, ſo as that the ſcrew may afterwards operate with as much advantage as poſſible, in producing a ſufficient degree of preſſure. When proper attention is paid to this circumſtance, a ſingle turn of the ſcrew, as we have ſaid, proves ſufficient for putting an entire ſtop to the circulation of blood in the limb; but when the ſtrap has not originally been made very tight, ſeveral turns of the ſcrew become neceſſary; an occurrence which may be always very eaſily prevented, and which, when not attended to, frequently proves very embarraſſing in the courſe of an operation.

Whenever it is determined, therefore, that any farther loſs of blood from a divided artery is to be prevented, preſſure on the ſuperior part of the veſſel ought to be immediately had recourſe to; by the hands of an aſſiſtant, or a proper bandage, when the cut is on the head or trunk of the body; and by means of the tourniquet, when any of the extremities are wounded.

The patient being in this manner ſecured from immediate danger, the practitioner muſt now proceed to the eaſieſt and moſt effectual mode of preventing a return of hæmorrhagy on the removal of the tourniquet.

The ancients, as we have ſeen, were ignorant of the uſe and application of the tourniquet, and they were equally deficient in the employment of means for giving a permanent ſecurity againſt the flow of blood from divided veſſels: It will therefore readily occur to every modern practitioner, that in this imperfect ſtate of Chirurgical knowledge, when any capital operations were attempted, they muſt have run a much greater riſk of doing miſchief, than of procuring any advantage to their patients. To the ſmaller veſſels they applied doſſils of linen covered with aſtringent powders; and for the larger arteries, ſearing with hot irons was their only reſource.

Even this laſt remedy however, although it commands a temporary ſtoppage of the blood in every caſe of hæmorrhage, its effects are by no means to be depended on: for, in general, the pulſation of the larger arteries very ſoon overcomes all the reſiſtance produced by the application of the cautery.

In ancient times, however, when this was the moſt effectual remedy with which the world was acquainted, practitioners were under the neceſſity of having recourſe to it; and, at that period, it is not ſurpriſing to find them exerciſing their genius in inventing a variety of ſtyptic applications: But ſince ſurgery became enriched with that material improvement of ſecuring the larger arteries by means of ligatures, a practice eaſily effected, and with very little pain to the patient, it is ſurpriſing to find that remedies of this kind are ſtill ſearched after. If the uſe of ligatures was in itſelf attended with much difficulty, if by experience it had been found to be productive of many bad conſequences, or, if it had been frequently known to fail in anſwering as a full ſecurity againſt the hæmorrhagies of the larger arteries; in any of theſe events, it ought to be the buſineſs of practitioners to endeavour to procure a more effectual remedy. But, as the ligature of arteries is very ſimple in its nature; as the pain ariſing from it is trifling; as few inſtances occur of any thing bad being produced by it; and eſpecially, as, when properly performed, it never fails of proving a ſure preventative againſt all loſs of blood from the larger arteries; there can therefore be no good reaſon for anxiouſly ſeeking after other remedies inſtead of it.

Agaric and other fungous ſubſtances have been much extolled for their ſtyptic powers; and chalybeate ſolutions, as well as all the variety of mineral acids, have in different forms been held forth to the public as effectual remedies of this nature; not only as noſtrums by thoſe of leſs liberal principles, but, what is more ſurpriſing, in ſome inſtances by practitioners of character.

With the former claſs of men this happens as a common occurrence in the courſe of their profeſſion, and is therefore to be expected; but, a perſeverance in queſt of any new remedy of this kind on the part of Surgeons of reputation, who are already well acquainted with the effects of ligatures in caſes of hæmorrhagy, and who alſo know that the practice is ſeldom attended with bad conſequences, muſt proceed from a degree of nicety and refinement, which may create much trouble to themſelves, but which in all probability can never be productive of any practical advantage.

We ſhall therefore venture to lay it down as an eſtabliſhed maxim in ſurgery, That in every caſe of hæmorrhagy from any of the larger arteries, no ſtyptic application whatever ought to be truſted to, the ligature being the only remedy to be depended on. We now proceed therefore to the conſideration of the eaſieſt and moſt effectual mode of carrying this application into execution.

Various methods have been invented for ſecuring arteries by means of ligatures. The practice now in ordinary uſe, is, by means of a curved needle, to paſs a ligature of ſufficient ſtrength round the mouth of the bleeding veſſel, including a quarter of an inch all round of the ſurrounding parts*, and afterwards to form a knot of a proper tightneſs upon the veſſel and other parts comprehended in the nooſe.

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* Sharp's Surgery—On Amputation.

One great objection, however, to this method, is, that the nerves accompanying the blood-veſſels, together with a conſiderable portion of the muſcular ſubſtance through which they paſs, muſt always be ſurrounded with every ligature formed in this manner. From this circumſtance much more pain is produced than is neceſſary, by the nerves and other parts being at the ſame time compreſſed with the arteries; and, on ſome occaſions, the ſame cauſe has evidently given riſe to violent convulſive affections, not only of the part chiefly affected, but of the whole ſyſtem.

Spaſmodic twitches are frequently found to occur after the amputation of limbs, and are often the ſource of much diſtreſs. In ſome inſtances they are no doubt to be conſidered as the effect of other cauſes; but in various caſes it has happened, that demonſtrative proof has been obtained of their ariſing from the ligatures of arteries having been applied in an improper manner. When ſuch convulſive affections occur after amputations, and the uſual means of preventing them being found to fail, effectual relief may be frequently obtained by deſtroying the ligatures altogether, ſo as to remove the compreſſion upon the nerves; care being taken at the ſame time to renew the ligatures upon the arteries immediately, without comprehending any of the contiguous parts.

Thus, it is not the ſimple ligature of veſſels to which any bad ſymptoms occurring in ſuch caſes are to be attributed; but to the operation being done in an improper manner, by including nerves and other parts, inſtead of tying the arteries by themſelves.

Practitioners have commonly been afraid of tying up blood-veſſels by themſelves without the intervention of ſome of the ſurrounding parts, on the ſuppoſition of the coats of arteries not being of a ſufficient firmneſs for bearing that degree of compreſſion neceſſary for the prevention of hæmorrhagy.

This, however, originates from an idea of the coats of arteries not being ſo ſtrong as they really are, and of a great degree of force being neceſſary for compreſſing the ſides of arteries into cloſe contact with one another.

But it is now well known, that even very ſmall arteries are poſſeſſed of much firmneſs; and it is alſo certain, that even in the largeſt arteries of the arm or thigh, a very ſlight degree of compreſſion is fully ſufficient, not only for reſtraining hæmorrhagy, but for ſecuring the ligature on the very ſpot to which it is firſt applied: And in ſmall veſſels the force neceſſary for this purpoſe is trifling indeed; being far leſs than is commonly practiſed.

Although the circumſtance we are now inſiſting upon may not at firſt ſight ſeem to be of much importance, yet in fact it merits very particular attention. Even of itſelf it is a matter of no ſmall conſequence, but it is the more material when we conſider it as connected in many inſtances with circumſtances on which the life of a patient may in a great meaſure depend; and we know well too, that ſucceſs in ſurgical operations depends more on a minute attention to every circumſtance relating to them, than on particular dexterity in any one part of them.

It has alſo been objected to this mode of ſecuring blood-veſſels by themſelves, that the ligatures, although they ſhould not cut the arteries through, yet are more apt to ſlip than when ſome of the ſurrounding parts are comprehended along with them; and, in ſome inſtances, it is ſaid that arteries retract ſo far, that they cannot in any other way be laid hold of, than by means of the crooked needle in the ordinary method.

Long and repeated experience, however, of a few individuals, of this mode of taking up arteries by themſelves, has put the fact beyond a doubt, that it is equally ſecure as any other yet invented *.—

Fatal

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* See an eſſay upon this ſubject, by Mr Aitken, an ingenious ſurgeon of Warrington.

Fatal hæmorrhagies after capital operations, either from inattention, or ſome other cauſe, do now and then indeed happen in the hands of the moſt able practitioners; but occurrences of this nature have as frequently happened when the curved needle was employed, as when the blood-veſſels were ſecured by themſelves without any of the contiguous parts being included.

From the reſult of my own experience, indeed, I ſhould be induced even from this conſideration, to draw a concluſion in favour of the method we have been endeavouring to inculcate. For, in the courſe of practice, both among hoſpital patients and in private, I have known different deaths occur from the bleeding of ſtumps after the amputation of members: Whether this proceeded from the ligatures having ſlipped from ſome of the arteries; or that ſome of the veſſels, from not appearing during the operation, had been of courſe paſſed over without being obſerved and had afterwards burſt out, I ſhall not pretend to determine; but in all of theſe, *the crooked needle only* had been uſed during the operation; and it has ſo happened, that I never met with a ſingle inſtance of a ſimilar occurrence where the arteries were ſecured by themſelves by means of *the tenaculum*, an inſtrument to be afterwards taken notice of.

In a few inſtances it may happen, that a bleeding veſſel, from lying at the bottom of a deep wound, cannot be laid hold of in any other manner than by the curved needle being made to paſs round it. Such occurrences, however, are exceedingly rare; inſomuch that I have ſeldom known an inſtance in which hæmorrhagy could not be as effectually reſtrained by the mode now to be pointed out, as by the uſe of the crooked needle.

In all operations whatever, to ſave *unneceſſary* pain ought to be a very capital object. In every buſineſs of this kind, the object in view ought no doubt to be attained in the moſt complete manner; but that mode by which we perform an operation equally well with any other, at the ſame time that we ſave a good deal of pain to the patient, is undoubtedly in every inſtance to be preferred. Now, with reſpect to the point in queſtion, as we have already clearly ſhown, that arteries may be tied with as much ſafety in every reſpect, by themſelves, as when connected with any of the neighbouring parts, the *difference of pain* produced by the two modes of operating, ought at once to determine in favour of the former.

When any of the contiguous parts, particularly when the nerves which generally accompany the blood-veſſels, are included in the ſame ligature with an artery, and which when the curved needle is employed is a circumſtance ſcarcely to be avoided, every practitioner knows that tying the knot in this manner is frequently complained of by the patient in very ſevere terms. I have on many occaſions known patients, who have bore the amputation of limbs, and of cancerous breaſts, without ſhrinking, complain bitterly of the ſevere pain produced by the method of ſecuring arteries by means of the crooked needle. And on the contrary, the pain attending the method now propoſed, is ſo trifling, that, when properly done, even the moſt timid patients very ſeldom complain of it.

For ſome time after I firſt began to uſe the tenaculum, curioſity induced me, on different occaſions, to put the matter under conſideration to the teſt of experiment: And to render the trial as fair and deciſive as poſſible, it was always made upon the ſame ſubject, under the ſame operation. Different veſſels were ſecured in the ordinary manner by the crooked needle; whilſt others were laid hold of by the tenaculum: But ſo great was the difference in point of pain, that the one was uniformly allowed to give very little uneaſineſs; whereas it frequently happened, that the other was complained of as the moſt painful part of the whole operation.

Among other advantages which the tying of arteries by means of the tenaculum has over the old mode of operating, there is ſtill one we have not yet taken notice of. It often happens after amputations, and other operations where the larger arteries have been tied, that the ligatures do not come eaſily away, from being made to run ſo deep as with the curved needle is commonly neceſſary. In ſome inſtances much pain and trouble has occurred from this circumſtance, the ligature remaining quite immoveable for a great many weeks: And after all, I have ſeen it neceſſary for the ſurgeon, to put the patient to a great deal of pain, by being obliged to cut out the threads with a ſcalpel. But when the tenaculum is uſed, every riſk of this kind is effectually avoided, from the ligatures generally falling off of their own accord, in the courſe of the third or fourth dreſſing of the ſore.

From what has been ſaid, therefore, we ſhall conſider it as a practice that ought to be eſtabliſhed, that in forming the ligature of arteries, the *nerves* and *other contiguous parts* ſhould be carefully avoided.

For the purpoſe of effecting this with eaſe and ſafety, forceps of various kinds have been invented; with theſe, the arteries of a ſore are laid hold of and pulled out, ſo as to admit of the application of ligatures.

For the larger blood-veſſels, the forceps have been found to anſwer conveniently enough; but, in the ſmaller arteries, they are by no means ſo fit for the purpoſe as the curved hook commonly termed a tenaculum, as repreſented in Plate I. And as a hook of this form anſwers equally well in the larger arteries likewiſe, the uſe of the forceps may therefore be laid entirely aſide. The manner of uſing the tenaculum is this.

In order to detect the arteries to be tied, the tourniquet with which they are ſecured, muſt be ſlackened a little by a turn or two of the ſcrew; and the moment the largeſt artery of the ſore is diſcovered, the ſurgeon fixes his eye upon it, and immediately reſtrains the blood again by means of the tourniquet. An aſſiſtant now forms a nooſe on the ligature to be made uſe of; and this nooſe being placed immediately over the end of the artery, ſo as to include it with certainty, the operator then puſhes the ſharp point of the tenaculum through the ſides of the veſſel, and at the ſame time pulls ſo much of it out, over the ſurface of the ſurrounding parts, as he thinks is ſufficient to be included in the knot which the aſſiſtant is now to make. In forming this ligature, the ſurgeon's knot, as it is termed, which conſiſts in paſſing the thread twice thro' the firſt nooſe, is certainly preferable to every other, from its being leſs liable to yield or ſlip. And as ſome additional ſecurity is obtained by forming a ſecond knot above the firſt, this precaution ought never to be omitted. It is eaſily done; and on ſecurity in this point, the patient's life may in a great meaſure depend.

The degree of ſtrength of the ligature muſt always be proportioned to the ſize of the veſſels; but this is a circumſtance to be at all times determined by the judgment of the practitioner, as muſt alſo the force to be employed in forming the knots. To what was already ſaid upon this point I ſhall juſt add, that a very ſmall force is fully ſufficient for ſecuring even the largeſt arteries; and that, after ſuch a force has been applied as evidently reſtrains the farther loſs of blood, a very trifling additional compreſſion is all that is in any degree neceſſary.

The principal artery being in this manner ſecured, all the veſſels of the part muſt one after another be taken up in the ſame manner, by firſt looſening the tourniquet in order to diſcover them, and afterwards applying the ligature to each in the manner directed.

It often happens, however, that the loſs of blood the patient has ſuſtained, a tendency to deliquium which may take place for the time, the fear he labours under, and the degree of cold to which the ſore is expoſed, have all together ſuch an effect upon the ſmaller arteries, as to prevent them for the time from diſcharging their contents, and as arteries left in ſuch a ſtate without being ſecured, generally burſt out on the removal of theſe cauſes, a circumſtance which always occaſions much trouble to the practitioner, as well as a great deal of pain to the patient, every ſurgeon therefore ought to pay the niceſt attention to this point.

The tourniquet ſhould be made perfectly looſe; any coagulated blood on the ſurface of the ſore, ought to be carefully waſhed off with a ſpunge and warm water; and the patient, if faintiſh, ought to get a glaſs of wine, or ſome other cordial; and after all, the ſurgeon ought to examine, with the moſt minute attention, the uſual courſe which the veſſels of the part are known to take.

This being done, every artery of the part, even the ſmalleſt that can be diſtinguiſhed, ought to be ſecured with a ligature: For ſuch veſſels as appear exceedingly trifling while the part is yet expoſed to the air, after the patient becomes warm in bed, when of courſe the ſolids become relaxed, and the fluids expand, even the ſmalleſt branches of arteries that happen to be neglected, will now be capable of producing much miſchief, by diſcharging very conſiderable quantities of blood; and, as little or no injury can ever occur by the proper application of ligatures to all the arteries that preſent themſelves, the greateſt attention ought at all times to be paid to this circumſtance.

I have inſiſted the more on this, from having frequently obſerved much uneaſineſs and diſtreſs produced by a want of proper attention to this part of an operation.

When the principal arteries of a ſtump have been taken up, and a little blood continues to be diſcharged, but appears to come from ſundry ſmall veſſels only, the ſurgeon, unleſs he is much accuſtomed to this kind of buſineſs, is induced to think, that as they are very trifling to appearance, ſo he need not be at the trouble of tying them, as the neceſſary compreſſion of the bandages proper for the wound will in all probability effect a total ſtoppage of the hæmorrhagy. In a general oozing of a ſmall quantity of blood from the whole ſurface of a ſore, and when no particular veſſel can be diſtinguiſhed, there is a neceſſity for truſting to this remedy; but, whenever an artery can be diſcovered, of whatever ſize it may be, it ought unqueſtionably to be ſecured by a ligature. It very rarely happens that any inconvenience occurs from ligatures when properly applied; but many lives have been loſt from a remiſſneſs in this article. I have known different inſtances of this, and the ſame muſt have occurred to others.

When, from the deepneſs of a wound, or from any other cauſe, ſome particular artery cannot be properly ſecured by the tenaculum, in this caſe we are under the neceſſity of employing the crooked needle, and the following is the mode of uſing it.

The operator ought to be provided with needles of various ſizes, and of different forms. The needles in ordinary uſe, are for many purpoſes quite too much crooked; for, in general, they are more eaſily managed

naged when their curvatures are not ſo conſiderable.

The ſame kinds of needles as are found neceſſary for the interrupted ſuture, as repreſented in Plate I. anſwer equally well for the ligature of arteries.

The needles in common uſe are made triangular, with three different edges, one on each ſide, and a third on the concave part of the needle. There is no real neceſſity, however, for more than two: Indeed the needle enters fully more eaſily with two than with three edges; and as the third edge on the concave ſide, renders them more liable to injure arteries and other parts in the courſe of their introduction, this addition ought therefore to be omitted.

A needle of this ſhape, armed with a ligature of a ſize proportioned to itſelf and to the veſſel to be taken up, is to be introduced at the diſtance of a ſixth or eighth part of an inch from the artery, and puſhed to a depth ſufficient for retaining it, at the ſame time that it is carried fully one-half round the blood-veſſel. It muſt now be drawn out; and being again puſhed forward till it has completely encircled the mouth of the artery, it is then to be pulled out, and a knot to be tied of a ſufficient firmneſs, as was already directed when the tenaculum is uſed.

In this manner, either by the uſe of the crooked needle, or of the tenaculum, every hæmorrhagy depending upon a diviſion of one or more large arteries, may in general be very eaſily reſtrained; but it frequently happens, that conſiderable quantities of blood are diſcharged, not from any particular veſſel, but from all the ſmall arteries over the ſurface of the ſore. In wounds of great extent, particularly after the extirpation of cancerous breaſts, and in other operations where extenſive ſores are left, this ſpecies of hæmorrhagy often proves very troubleſome by being exceedingly difficult to ſuppreſs.

Bleedings of this kind ſeem evidently to proceed from two very different and oppoſite cauſes; a circumſtance which, in the treatment of them, is a matter of much importance to attend to.

First, We now and then find effuſions of this nature occurring in ſtrong robuſt people, where they evidently proceed, either from too great a quantity of blood contained in the veſſels, or from an over degree of tone in the veſſels themſelves; or, perhaps, from a combination of both theſe cauſes. But, Secondly, Such evacuations undoubtedly happen moſt frequently in conſtitutions quite the reverſe of the former, viz. in ſuch as are very relaxed and debilitated; either from a putrid diſſolved ſtate of the blood, or from a want of tone in the containing veſſels, or in ſome inſtances from a concurrence of both.

In conſtitutions perfectly healthy, when the fluids are not tainted with any degree of putreſcency, and the ſolids are poſſeſſed of their natural tonic powers, on the occurrence of wounds even of the moſt extenſive nature, ſo ſoon as the larger arteries are ſecured, all the ſmall veſſels that have been divided, in conſequence of that contractile power with which in a ſtate of health they are endowed, and from the ſtimulus of the external air to which they are now expoſed, are diminiſhed not only in their diameters, but alſo in their length; in conſequence of which, they recede conſiderably within the ſurface of the ſurrounding parts.

This cauſe of itſelf would probably in the greateſt number of inſtances prove ſufficient for reſtraining all loſs of blood from the ſmaller arteries; but, in the ſound ſtate of conſtitution of which we have now been ſpeaking, another very powerful agent is provided by nature for producing the ſame effect. From the extremities of the divided veſſels which at firſt diſcharged red blood only, there now, in their contracted ſtate, oozes out a more thin, though viſcid fluid, containing a great proportion of the coagulable parts of the blood; and this being equally diſtributed over the ſurface of the wound, by its balſamic agglutinating powers, has undoubtedly a very conſiderable influence in reſtraining all ſuch hæmorrhagies.

In conſtitutions altogether healthy, where neither of the ſtates of diſeaſe we have alluded to preponderates over the other, we find, that, ſo ſoon as the larger arteries of wounds are ſecured, nature, in the manner already deſcribed, generally puts a ſtop to all farther diſcharge. So that, whenever the contrary happens, by a tedious oozing continuing from the ſurface of the ſore, we ought then to pay particular attention to the habit of body with which it is connected.

When ſuch an occurrence happens in a patient, young and vigorous, and where the tone of the muſcular fibres is evidently great, the moſt effectual means of putting a ſtop to the diſcharge, is to relax the vaſcular ſyſtem, either by opening a vein in ſome other part, or, what gives ſtill more immediate relief, by untying the ligature on one of the principal arteries of the part, ſo as to allow it to bleed freely: Thoſe violent ſpaſmodic twitchings too, ſo frequent after operations on any of the extremities, when they do not depend on a nerve being included in the ligature with the artery, are in this manner more effectually relieved than by any other means.

By the ſame means, the patient, from being in a febrile heat and much confuſed, ſoon becomes very tranquil: The violent pulſation of the heart and larger arteries abates, and, the blood not being propelled with ſuch impetuoſity into the ſmaller veſſels of the part, they are thereby left at more liberty to retract; and as in this ſtate they do not pour forth red blood ſo freely, they are the more readily covered with that viſcid glutinous fluid which we have already ſhown to be one of the moſt important means intended by nature for the prevention of ſuch hæmorrhagies. At the ſame time that by the means recommended we endeavour to allay the commotion produced in the ſyſtem, the patient ought to be kept exceedingly cool; wine and other cordials ſhould be rigidly avoided; cold water, acidulated either with the mineral or vegetable acids, ought to be the only drink; motion of every kind, particularly of the part affected, ſhould be guarded againſt; and the wound being gently covered with ſoft charpie, ought to be tied up with a bandage ſo applied as to produce a moderate degree of preſſure on the extremities of the divided parts.

In every extenſive wound attended with hæmorrhagies of this kind, and particularly when violent ſpaſmodic affections of the muſcles ſupervene, together with the means already recommended, large doſes of opiates are found highly beneficial; for whatever hurtful effects may have been apprehended from opiates in ſome inflammatory affections, every practitioner who has ventured on a free uſe of them muſt admit, that in all occurrences of this nature their influence far ſurpaſſes that of any other remedy.

So ſoon therefore as a ſufficient quantity of blood has been diſcharged, and the wound being dreſſed and the patient laid to reſt;

a doſe of opium proportioned to the violence of the ſymptoms ought to be immediately exhibited. It ought to be remarked however, that, in all ſuch circumſtances, much larger doſes of the remedy are neceſſary, than in ordinary caſes requiring the uſe of opiates. Small doſes, inſtead of anſwering any good purpoſe, ſeem frequently rather to aggravate the various ſymptoms; ſo that, whenever they are here had recourſe to, they ought always to be given in quantities ſufficient for the intended effect.

Although hæmmorrhagies of this nature do now and then occur in firm vigorous conſtitutions; yet they undoubtedly happen much more frequently in relaxed enfeebled habits, where the ſolids have loſt part of their natural firmneſs, and the fluids have acquired ſome degree of putreſcency. As the veſſels in this ſituation of matters are ſuppoſed to have been deprived of that degree of tone of which we wiſh them to be poſſeſſed, inſtead of reſtraining the patient from the uſe of cordials, as is done uſually *in* *every caſe of hæmorrhagy*, a moderate uſe of generous wine ought to be immediately preſcribed; for nothing, it may be obſerved, tends ſo much in ſuch circumſtances to reſtrain hæmorrhagies, as a well-directed uſe of proper cordials. By tending to invigorate and brace the ſolids, they thereby enable the arterial ſyſtem to give a due reſiſtance to the contained fluids; and the ſame cauſe, it may be obſerved, has a conſiderable influence in reſtoring to the fluids that viſcidity of texture, of which in all ſuch inſtances we ſuppoſe them to be deprived.

Whenever, therefore, ſuch tedious hæmorrhagies occur in relaxed debilitated habits, a free uſe of Port, Madeira, or any other wine whoſe ſtrength and goodneſs can be depended on, ought to be immediately allowed; a nouriſhing diet alſo becomes proper; the patient ought to be kept cool; and the mineral acids, from their known utility in every ſpecies of hæmorrhagy, ought alſo to be preſcribed. Reſt of body is here proper too; and opiates, when indicated either by pain or ſpaſmodic affections of the muſcles, ought never to be omitted.

Together with theſe remedies adapted to the general ſyſtem, particular dreſſings, appropriated to the ſtate of the parts to which they are to be applied, have been found very beneficial. We have already remarked, that in firm healthy conſtitutions, ſo ſoon as the diſcharge of blood which naturally occurs in every large wound is over, the parts come ſoon to be covered with a viſcid coagulable effuſion from the mouths of the now retracted arteries; but in conſtitutions of an oppoſite nature, where the ſolids are much relaxed, the blood in general is found in ſuch a diſſolved ſtate as to afford no ſecretion of this nature.

In order therefore to ſupply as much as poſſible the deficiency of this natural balſam, different artificial applications have been invented. Duſting the parts with ſtarch or wheat flour, has ſometimes been found of uſe; and I have known gum arabic in fine powder to anſwer when theſe have failed.

Applications of this kind, indeed, have been uſed with ſucceſs in all ſuch hæmorrhagies, with whatever habit of body they happen to be connected; but they have always proved more particularly ſerviceable in relaxed conſtitutions, attended with a diſſolved ſtate of the blood and an enfeebled muſcular ſyſtem. We may here uſe with freedom too, a remedy which in ſuch circumſtances generally proves ſerviceable, but which in conſtitutions of an oppoſite nature ought never to be employed. The remedy alluded to is alcohol, or any other ardent ſpirits, impregnated with as great a quantity as they can diſſolve of myrrh or any other of the heating viſcid gums. The balſamum traumaticum of the ſhops, a remedy of this nature, has long been famous for its influence in ſuch caſes, but that indiſcriminate uſe of this and ſimilar applications which has long prevailed with ſome practitioners, I am confident has done much harm; for, as they are all poſſeſſed of very ſtimulating powers, they of courſe tend to aggravate every ſymptom in wounds connected with a tenſe ſtate of fibres, when much pain, and eſpecially when ſpaſmodic muſcular affections, prevail. But, in conſtitutions of an oppoſite nature, where the blood appears to be in a diſſolved ſtate, and where the arterial ſyſtem ſeems evidently to require a ſtimulus, remedies of this claſs come to be very uſeful: Inſomuch that, in every conſtitution of this kind where hæmorrhagies prove troubleſome, no application whatever is found to anſwer better, than charpie immerſed in an agglutinating ſpirituous balſam of this nature.

By a due perſeverance in one or other of the plans here pointed out, it will ſeldom happen that hæmorrhagies of this nature are not at laſt put a ſtop to: But when the contrary does occur; when, notwithſtanding the uſe of the remedies recommended, a diſcharge of blood ſtill continues; together with the means already adviſed, an equal moderate preſſure ought to be applied over the whole ſurface of the ſore, to be continued ſo long as the neceſſity of the caſe ſeems to indicate.

In finiſhing the dreſſings of ſuch wounds, after the charpie and compreſſes have been applied, a bandage properly adapted to the part ought to conclude the whole, and in ſuch a manner as to produce as equal a degree of preſſure over the ſurface of the ſore as poſſible. But it now and then happens, that no bandage whatever can be ſo applied, as to produce the deſired effect; and in ſuch caſes, the hand of an aſſiſtant is the only reſource. In ſuch inſtances, a perſon's hand being firmly applied over the dreſſings, ſo as to produce a very equal degree of preſſure, will commonly ſucceed when no other remedy is found to have much influence.

Having thus endeavoured to point out the moſt effectual means of putting a ſtop to morbid hæmorrhagies, we ſhall now proceed to conſider the different modes employed by art, for effecting a diſcharge of blood when indicated by the preſence of ſome diſorder in the conſtitution.

CHAP. III.

Of BLOOD-LETTING.

SECTION I.

Of Blood-letting in general.

BLOOD-LETTING, whether we conſider it as to its influence on the ſyſtem, or with reſpect to the niceneſs and even difficulty in the mode uſually employed for effecting it, is perhaps one of the moſt important operations in ſurgery. From being ſo frequently put in practice, and from every pretender to any knowledge in the healing art being able to perform it without any apparent difficulty, the public have been induced to conſider it as trivial with reſpect to its execution; but every practitioner of character muſt acknowledge, that, in order to perform this operation properly, the greateſt nicety, ſteadineſs, and exactneſs, are neceſſary. All the other operations in ſurgery I have frequently ſeen well performed; but I can with freedom ſay, that I have ſeldom ſeen blood-letting with the lancet done very correctly: When properly performed, it is really a neat operation; but when not done with much exactneſs, it is the very reverſe.

It is not here meant to enter into the conſideration of the various cauſes which in different circumſtances point out the propriety of abſtracting blood from the ſyſtem; nor is it intended to enter upon a particular diſcuſſion of the different effects produced by general and topical blood-letting: Theſe conſiderations, as being highly important, would of themſelves extend to a very great length; and beſides, are of ſuch a nature as renders it impoſſible to enter minutely upon their diſcuſſion in any ſyſtem of ſurgery. All that is here intended, is to deſcribe, as clearly as poſſible, the various modes of performing the operation of blood-letting.

In all inflammatory affections producing a general diſorder of the ſyſtem, the method of taking away blood as now eſtabliſhed by immemorial practice, is, by ſuch means as diſcharges the quantity to be taken in a ſhort ſpace of time, by an opening made with a lancet, either in an artery or in a vein. Whether there is any real difference in the effects produced by theſe two modes of diſcharging blood, it may be difficult to determine with any preciſion; but there is reaſon to ſuppoſe, that, independent of the quantity taken, the difference is of leſs importance than is commonly imagined. The latter of theſe termed Phlebotomy, and the former Arteriotomy, are the means employed for what we term *general* blood-letting, the particular conſideration of which we ſhall preſently attend to.

But it often happens in diſorders of an inflammatory nature, where there is evidently a fixed local affection, and where no great degree of fever takes place, that general blood-letting has not much influence in mitigating the ſymptoms; and in ſuch circumſtances conſiderable advantage is frequently obtained by diſcharging blood from the part immediately affected, by dividing a number of the ſmall veſſels which ſupply it; and this we term *Topical* or *Local* blood-letting. The means employed by art for diſcharging blood in this manner ſhall be afterwards treated of, and we now return to the particular conſideration of phlebotomy.

Wherever a vein of a tolerable ſize can be reached with ſafety, an opening for the diſcharge of blood may be made in it with a lancet; but the following are the parts from whence blood is uſually taken in this manner; viz. from the veins of the arm at the flexure of the cubitus; from the jugular veins; and from the veins of the ankles and feet. On particular occaſions, too, blood is adviſed to be taken from the veins of the hand, of the tongue, &c.

There are ſome general rules and obſervations which relate equally to this operation in whatever part of the body it is practiſed;

tiſed; theſe we ſhall in the firſt place enumerate with as much accuracy as poſſible, and ſhall afterwards proceed to treat particularly of blood-letting in the arm and other parts.

I. In this as in every other operation, the ſituation of the patient, and of the operator likewiſe, ought to be preciſely fixed. As the ſituation of a patient during the operation of blood-letting, has a conſiderable influence on the effects produced by the evacuation upon the ſyſtem, this circumſtance therefore merits our particular attention. In ſome diſorders, it is the object of this remedy, to evacuate a conſiderable quantity of blood without inducing fainting: When this is the caſe, and when from former experience it is known, that the patient to be operated upon is liable during the evacuation to fall into a faintiſh ſtate, a horizontal poſture, either upon a bed or on a couch, ought to be preferred to every other, for every practitioner is now well acquainted with this fact, that fainting

ing is not near ſo ready to occur in a horizontal as in an erect poſture.

It now and then happens, however, that one material advantage expected from the operation of blood-letting, is the production of a ſtate of deliquium; as for inſtance, in caſes of ſtrangulated hernia, where a general relaxation of the ſyſtem is ſometimes deſirable. In all ſuch circumſtances, inſtead of a horizontal poſture, the more erect the patient is kept, the more readily will a ſtate of fainting be induced: So that the particular object in view from the operation, muſt at all times determine this matter.

While we thus, however, attend particularly to the poſture of the body at large, the particular poſition of the limb or part to be operated upon muſt not be neglected. In every operation it is a matter of much importance to have the patient ſeated in a proper light, but in none is it more material than in blood-letting. The beſt general rule that can be given upon this point is, that the patient ought to be ſo placed, as that the principal light of the apartment ſhall fall directly upon the part to be operated upon, ſo that the vein to be opened may be made as apparent as poſſible. When clear day-light can be obtained, it ought to be preferred; but when not to be had in perfection, one or more candles ſhould be had recourſe to.

But, whatever may be the poſition of the part to be operated upon, and whether the patient is to be placed on a bed or on a chair, the ſurgeon ought always to be ſeated. The operation may, no doubt, be done while the ſurgeon is ſtanding; and it is moſt frequently indeed performed in this manner: But it can never be done either with ſuch ſteadineſs or neatneſs, as when the operator is firmly ſeated on a chair.

II. From the coats of veins being more flaccid than thoſe of arteries, and from the blood not proceeding with ſuch rapidity in the former as in the latter, an opening made in one of theſe will ſeldom diſcharge blood freely, unleſs the vein is either cut entirely acroſs, which in general would be productive of diſagreeable conſequences, or that the blood be prevented from returning to the heart, by means of a ligature placed between the heart and that part of the vein in which the opening is to be made.

The patient being properly ſeated, the next ſtep in every operation of this kind muſt therefore be, by means of a proper bandage ſo to compreſs the vein intended to be opened, as to prevent the blood from returning to the heart; and for the ſame reaſon, an equal degree of preſſure it is obvious, ought to be applied to all the other veins of the part; for, if this circumſtance ſhould not be attended to, the communication preſerved by the collateral correſponding branches, would render the preſſure upon any one particular vein of very little importance. But, independent of its producing a more free diſcharge of blood than could be otherwiſe obtained, this preſſure upon the veins by inducing an accumulation of their contents, tends to bring them more evidently into view, and conſequently renders it eaſier for the operator to effect a proper opening than he would otherwiſe find it.

Although compreſſion, however, to a certain extent, is neceſſary for this purpoſe of accumulating a quantity of blood in the veins, and for afterwards diſcharging it at an opening made by the lancet, it is at the ſame time perfectly evident, that any conſiderable degree of preſſure, inſtead of forwarding theſe purpoſes, muſt obſtruct them entirely; for, if the preſſure intended to be applied to the veins only, ſhould accidentally be carried ſo far as to reſt materially upon the arteries connected with them, all farther acceſs of blood to the veins would be thereby cut off, ſo that no evacuation of importance could take place at any opening to be made in them. Whenever it is intended, therefore, to evacuate blood in this manner, a good deal of nicety is requiſite in applying this preſſure upon the veins: It ought always to be carried ſo far as effectually to compreſs the veins of the part, but never to ſuch a length as to obſtruct the circulation in the correſponding arteries. When we ſee that the preſſure applied has the effect of raiſing the veins, and if at the ſame time the pulſation of the artery is diſtinctly felt in the inferior part of the member, we may then be certain that it is to a very proper degree, and that it ought not to be carried farther: For, by the ſwelling of the veins, we are ſure that they are ſufficiently compreſſed; and by the arteries continuing to beat, it is evident that a continued flow of blood may be expected.

III. The reflux of blood to the heart being in this manner prevented, the next queſtion to be determined, is, the beſt method of making an opening into the vein. Different inſtruments have been invented for this purpoſe; but there are two only which have been retained in uſe, and which are all, therefore, that here require to be mentioned. Theſe are, the Lancet and the Phlegm. This laſt, on being placed immediately on the part to be cut, is by means of a ſpring puſhed ſuddenly into the vein, and produces an opening of the exact ſize of the inſtrument employed.

The phlegm, in many parts of Germany, has acquired ſome reputation, particularly in taking blood from the jugular vein: But there are various objections to the uſe of this inſtrument, which muſt undoubtedly prevent it from ever coming into general uſe; and theſe particularly are, that we are obliged, from the nature of the inſtrument, to regulate the deepneſs to which it is to go, before it is applied: Now we know well, that in blood-letting this is a circumſtance we are never by any means certain of; for we frequently after the introduction of a lancet, find it neceſſary to go much deeper than was at firſt expected; ſo that, when a phlegm is uſed, unleſs we employ one on every occaſion of a length which cannot be frequently required, we muſt often meet with diſappointments.

But the moſt material objection to this inſtrument is, that where there are arteries or other parts lying below the veins, and in any danger of being hurt by the operation of blood-letting, the riſk is much greater with the phlegm than with the lancet: For when the lancet is uſed, after the vein is once opened, the orifice may be enlarged at pleaſure without any additional riſk, merely by carrying the inſtrument forward along the courſe of the vein in the ſame depth to which it was at firſt introduced; whereas with the phlegm, ſo ſoon as it enters the vein, it muſt for certain paſs directly downwards to its full length; a circumſtance which adds greatly to the riſk of wounding the parts underneath.

Independent of this too, by the uſe of the lancet, we have it much more in our power to command an orifice of a determined ſize than when the phlegm is uſed: So that without heſitation, we may venture to pronounce the phlegm, to be an inſtrument in no degree neceſſary; but for ſuch as incline to uſe it, the moſt convenient form of one is repreſented in Plate III. fig. 2.

The manner of uſing the phlegm is as follows. The bandage for ſecuring the turgeſcency of the veins being applied in

Plate IV.

2.

Fig. 3.

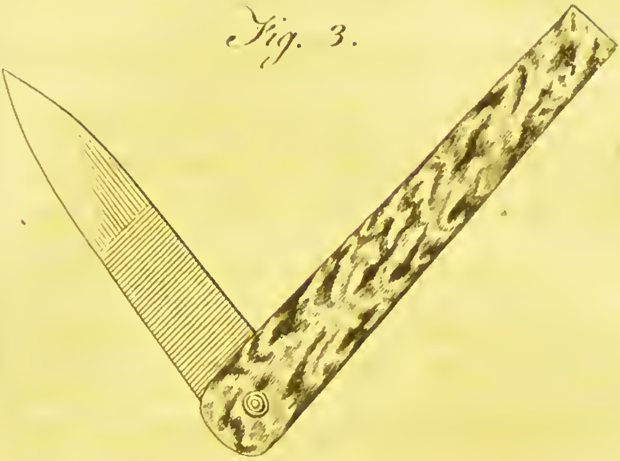


Fig. 4.

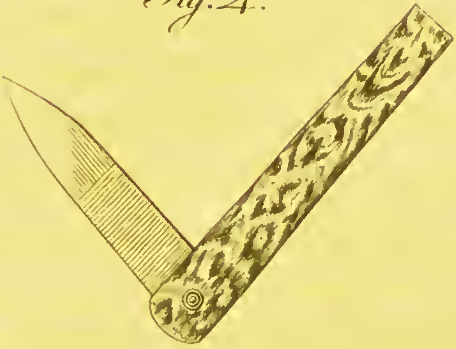


Fig. 5.

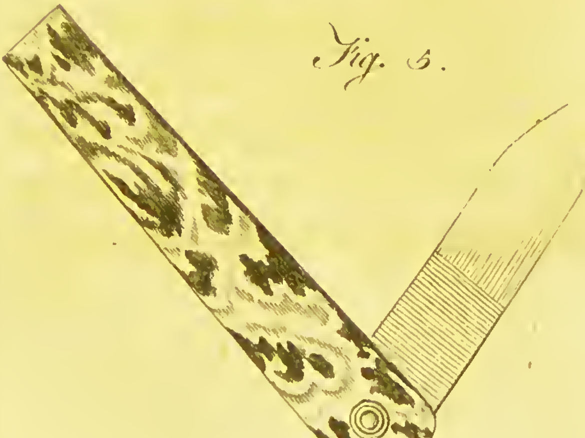
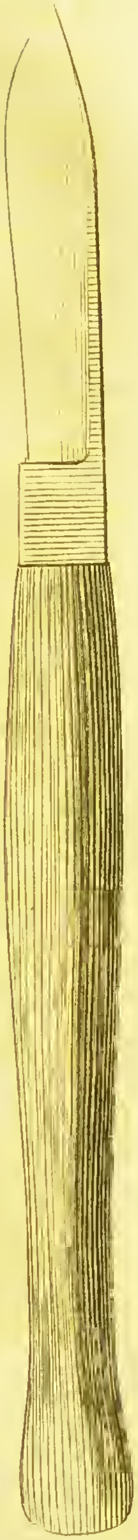


Fig. 1.



A. Bell Sculp!

the manner already directed, the point of the inſtrument *A*, with the ſpring properly bent, muſt be ſo placed upon the part of the vein to be opened, that an orifice of an oblique direction may be made in it on the ſpring *B* being let looſe. The ſubſequent management is the ſame here as when the lancet is uſed, and which will be preſently pointed out.

When it is determined to have recourſe to the lancet, the form of the inſtrument is evidently the firſt circumſtance requiring our attention; although we may here remark, that this point is ſeldom ſo particularly attended to as it ought to be.

The form of lancet in ordinary uſe, as repreſented in Plate IV. fig. 5. is an inſtrument which ought to be laid entirely aſide. For opening abſceſſes it is very well calculated, but for the operation of blood-letting it ought never to be uſed.

The capital objection to this form of lancet, is, that the broadneſs of its ſhoulders produces always a wound in the external teguments of perhaps three times the ſize of the opening made in the vein; a circumſtance which adds no advantage whatever to the operation: On the contrary, it produces much unneceſſary pain in the firſt inſtance; it renders it frequently a very difficult matter to command a ſtoppage of the blood; and the wounds produced by it are commonly ſo extenſive as to render them very liable to terminate in partial ſuppurations, an occurrence which always proves painful and diſagreeable to the patient.

The ſpear-pointed lancet, on the contrary, as repreſented in Plate IV. fig. 3. and 4. is an inſtrument in every reſpect well calculated for the purpoſe of venæſection. From the acuteneſs of its point, it enters the teguments and vein with very little pain; which, we may here obſerve, is with many patients a circumſtance of no ſmall importance: We are ſure of making the opening in the vein equal, or nearly ſo, to the orifice in the external teguments: And the diſcharge of blood produced by an opening made with one of theſe lancets, is commonly put a ſtop to with great eaſe, immediately on removing the ligature upon the vein.

For theſe reaſons therefore the ſpear-pointed lancet is highly preferable to every other: And although, with timid practitioners, the acute point of this inſtrument may appear to require more dexterity in uſing it than the broad-ſhouldered lancet; yet the difference in this reſpect is ſo inconſiderable, that very little experience of its excellency, muſt with every practitioner who gives it a fair trial, very ſoon counterbalance all ſuch objections. Indeed no ſurgeon ought to be truſted in letting blood with the one, whoſe ſteadineſs and dexterity would be in any degree doubted with the other.

IV. The form of lancet being thus fixed upon, we come now to ſpeak of the method of uſing it. The ſurgeon and patient being both properly ſeated, and the ligature having been applied for a ſhort ſpace of time in order to produce ſome degree of ſwelling in the veins, that vein is to be made choice of, which, at the ſame time that it appears conſpicuouſly enough, is found to roll leſs than the others on being preſſed upon by the fingers. There are ſome veins which roll ſo much, from being looſe and unconnected with the cellular ſubſtance of the part, that although they may riſe ſufficiently, yet are much worſe to operate upon than others which lie at a much greater depth. That vein therefore is to be preferred which not only riſes ſo as to become perfectly evident, but which appears to be connected with ſome degree of firmneſs to the contiguous parts. It is ſcarcely thought neceſſary to obſerve here, that when a vein appears to be ſo immediately connected with a contiguous artery or tendon, as evidently to produce ſome riſk of wounding theſe parts in the operation, and if another vein not liable to ſuch hazard can be procured, it ought undoubtedly to be preferred.

Veins may lie directly above both arteries and tendons, and yet no manner of riſk be incurred by opening them, provided the operator is ſufficiently ſteady and attentive;

tive; but it does now and then happen, that veins are ſo nearly and intimately connected with theſe parts, as to render it hazardous even for the moſt dexterous ſurgeon to attempt this operation.

The vein being at laſt made choice of, the ſurgeon, if he is to uſe his right-hand in the operation, takes a firm hold of the member from whence the blood is to be drawn with his left, and, with the thumb of the ſame hand, he is now to make ſuch a degree of preſſure upon the vein, about an inch and half below the ligature, as not only to render the ſkin and teguments ſomewhat tenſe, but at the ſame time to interrupt for a little all comunication between the under part of the vein, and that portion of it lying between the ligature and the thumb placed as thus directed.

The lancet being bent to ſomewhat more than right angles, the operator now takes it between the finger and thumb of his right-hand; and, leaving at leaſt one half of the blade uncovered, he reſts his hand on the middle finger, ring-finger, and little finger, all placed as conveniently as poſſible in the neighbourhood of the vein from whence the blood is to be taken, and having puſhed the point of the inſtrument freely through the ſkin and teguments into the vein, he now carries it forward in an oblique direction, till the orifice is of the ſize he inclines to have it; taking care, during the time of puſhing on the lancet, that its point be kept in as ſtraight a direction as poſſible, for fear of dipping into the parts below.

The inſtrument is now to be withdrawn, and the ſurgeon removing the thumb of his left hand, is to allow the vein to empty itſelf freely into the different cups previouſly provided for the purpoſe.

It is here of importance to obſerve, that, during the time the blood is diſcharging, the member ought to be kept in exactly the ſame poſture it was in when the lancet was firſt introduced: Otherwiſe, the orifice in the ſkin is apt to ſlip over the opening in the vein; a circumſtance which always proves inconvenient, and on ſome occaſions produces a good deal of trouble by the blood from the vein inſinuating itſelf into the ſurrounding cellular ſubſtance.

In taking hold of the lancet, we have directed the ſcales to form rather an oblique angle with the blade of the inſtrument. It will anſwer when they are even at right angles; but a farther ſeparation proves always troubleſome by throwing the ſcales too much out upon the operator's hand. The length of inſtrument left out from between the finger and thumb is another circumſtance requiring our attention; for unleſs a ſufficient quantity of it is left uncovered, the operator cannot act with freedom. In lancets of an ordinary length, one half of the blade, or very nearly that quantity, ought always to be left out.

The entry of the lancet into the vein is the next circumſtance we have deſired to be attended to. By very little attention the entrance of the inſtrument into the vein may be diſtinctly perceived; for ſo ſoon as its point has entered the cavity of the veſſel, the reſiſtance to its farther progreſs is evidently found to be much diminiſhed; and immediately on the opening being in any degree enlarged, the blood begins to ruſh out, which is the cleareſt proof of the operation being ſo far complete. On being thus rendered ſure that the lancet has got into the vein, we have alſo deſired that it may be carried forward in an oblique direction, taking care to keep the point of the inſtrument in the ſame degree of elevation from the inſtant it has paſſed fairly through the coats of the vein; and to this part of the operation we would beg the moſt particular attention. To the want of neceſſary caution in this matter, or rather to the improper regulations held forth upon it by every writer on this ſubject, much of the riſk attending this operation ought to be attributed.

The propriety of an oblique direction for the courſe of the orifice is very obvious: For, when made altogether longitudinal, the ſides of the wound are apt to fall immediately together, ſo as not to admit of a free diſcharge of blood; and, on the other hand, when the vein is cut entirely acroſs, troubleſome conſequences commonly enſue from the wound being very difficult to heal: An orifice ſomewhat oblique with reſpect to the courſe of the vein, is therefore preferable to either. But the material circumſtance to be kept in view, is the direction of the point of the lancet after it has got fairly into the vein. By almoſt every author who has wrote upon blood-letting, ſo ſoon as the lancet is known to have got into the vein, in order to extend the orifice to a ſufficient length, we are directed, very properly, to carry the inſtrument forward: But in what manner are we deſired to do ſo? By raiſing the *heel* of the lancet, as it is termed, at the ſame time that the point and edge of it is puſhed forward, ſo as to make the point of the inſtrument the centre of motion.

The reaſon of this laſt precaution is, that the internal orifice of the vein may not be farther extended upwards than the external wound in the ſkin and other teguments; as ecchymoſes, or effuſions of blood into the cellular ſubſtance, have with the broad-ſhouldered lancet been found frequently to occur from a contrary management. But when the ſpear-pointed lancet is uſed, this is an occurrence which need never happen; as, from the narrow point of the inſtrument, it may with ſafety be carried on in the cavity of the vein as far as is neceſſary. The orifice produced by it in the vein, muſt, when the operation is properly done, be always of very nearly the ſame extent as the external wound in the teguments: And by the ſame management we avoid that capital riſk which it is evident muſt always occur from an implicit obedience to the direction alluded to; for one certain effect of raiſing the heel, or back part of the lancet, is, that the point of the inſtrument muſt in the ſame proportion be depreſſed; and the conſequence of lowering the point of the lancet, already perhaps ſliding along the under ſide of the vein, muſt at once appear to be very hazardous. For in ſuch circumſtances, if the point of the inſtrument be depreſſed, which muſt undoubtedly happen if the back part of it be elevated, it muſt for certain paſs through the back part of the vein; ſo that if either an artery, nerve, or tendon, lie contiguous, they muſt of neceſſity be wounded; and I am perfectly convinced, that this cauſe alone has frequently been the origin both of wounded arteries, and of pricks in the nerves and tendons. So that as the hazard of the practice, whenever it is attentively conſidered, muſt at once appear evident, and as the ſuppoſed inconvenience ariſing from a contrary mode of operating is effectually prevented by the uſe of the ſpear-pointed lancet, all ſuch riſks therefore ſhould be carefully avoided.

With reſpect to the ſize of orifice in caſes of blood-letting, this circumſtance muſt at all times be determined by the nature of the diſorder for which the evacuation is preſcribed. When a ſudden loſs of a conſiderable quantity of blood is intended, either with a view to produce a ſtate of fainting, or for any other reaſon, a free large orifice is abſolutely neceſſary; but in ordinary practice, no neceſſity occurs for this.

In uſing a ſpear-pointed lancet, an orifice of about an eighth part of an inch in length will in general anſwer every purpoſe; but when a lancet with broad ſhoulders is uſed, an opening of twice that ſize is little enough, for with ſuch an inſtrument the orifice in the vein can ſeldom be above half the extent of the external opening.

After withdrawing the lancet from the orifice, we have directed the thumb of the left-hand to be removed from the place it was made to occupy. Many circumſtances may appear to be related here with unneceſſary minuteneſs, and this among others may poſſibly be conſidered as one; but in an operation of importance, every particular requires much attention. Now, one material uſe of the thumb placed below the part where the lancet was directed to enter, is, to keep the teguments and vein firm, ſo as to prevent the latter from rolling. But another advantage occuring from it is, that, by making a ſufficient degree of preſſure upon the vein, it thereby prevents any conſiderable quantity of blood from eſcaping between the time of removing the lancet, and the application of one of the cups for receiving the blood from the orifice in the vein. During this period it frequently happens, that a good deal of blood is diſcharged, to the great annoyance both of the patient, the operator, and byſtanders; a circumſtance which, with a little attention, may be always effectually prevented.

V. When the vein is properly cut, and the orifice is made ſufficiently large, it rarely occurs that any difficulty is experienced in procuring all the blood that is wanted. But it now and then happens otherwiſe, either from the orifice of the ſkin and other parts having receded from the opening in the vein; or from the patient having become faintiſh a ſituation always unfavourable to a free diſcharge of blood. When this laſt circumſtance occurs, a ſtream of freſh air ought to be admitted to the apartment, wine or ſome other cordial ſhould be adminiſtered, and the patient ought to be laid into a horizontal poſture. By theſe means the faintiſhneſs will in general be ſoon removed; but if ſtill the blood ſhould not flow freely, the member ought to be put into all the variety of poſitions that can probably aſſiſt in bringing the opening of the ſkin and other teguments to correſpond with that of the vein, which will ſoon be known to have happened by the blood beginning inſtantly to flow. Throwing the muſcles of the part into conſtant action, by giving the patient a cane or any other firm ſubſtance, to turn frequently round in his hand when the operation is done in the arm, will often anſwer in producing a conſtant flow of blood from a vein, when every other means has failed: And laſtly, when the pulſe in the inferior part of the member is felt very feeble, or eſpecially if it can not be diſtinguiſhed at all, we may be thereby rendered certain that the ligature is too tight, and may in general have it in our power to produce an immediate flow of blood by removing the compreſſion thus improperly made upon the arteries of the part.

VI. A quantity of blood proportioned to the nature of the diſorder, being thus diſcharged, the preſſure upon the ſuperior part of the vein ſhould be immediately removed; and this being done, if the ſpear-pointed lancet has been uſed all farther loſs of blood will in general ſtop immediately. The contrary of this, however, ſometimes occurs, and blood continues to flow freely even after the ligature is removed. When this is the the caſe, the operator ought to compreſs the vein both above and below the orifice by means of the finger and thumb of one hand, ſo as to prevent any farther loſs of blood: And this being done, the limb ought to be waſhed and entirely cleared of any blood that may have fallen upon it; and the orifice being alſo cleared of every particle of blood, the ſides of it ſhould be laid as exactly together as poſſible, and a piece of court or any other adheſive plaſter, being ſo applied as to retain them, it will ſeldom happen that any kind of bandage is neceſſary: But when the blood has iſſued with uncommon violence during the operation, and has been difficult to command after the removal of the ligature, in ſuch inſtances it will be prudent to apply a ſmall compreſs of linen over the plaſter, and to ſecure the whole with a linen roller properly applied round the member.

Before applying the plaſter, we have directed the orifice to be perfectly cleared of every particle of blood; and this, it may be obſerved, is a circumſtance of more importance than is commonly imagined; for, by not attending particularly to this point, and from want of exactneſs in cloſing the lips of the orifice, painful ſwellings and conſequent ſuppurations are often induced, which a very little attention would have eaſily prevented. In every inſtance when the operation is properly done, the wound ought to heal by what ſurgeons call the firſt intention, that is, by the parts adhering to one another without the formation of matter; but this can ſeldom happen if the lips of the ſore have not been very neatly laid together after all the blood has been perfectly cleared away.

Another argument of importance, too, occurs for neatneſs in this matter. Among other troubleſome conſequences ariſing now and then from blood-letting, inflammation produced in the cavity of the vein has in ſome inſtances been known to occaſion much miſchief; and as nothing tends more to ſuch an occurrence than the admiſſion of air to the part, by the orifice in the vein not being properly cloſed, this circumſtance of itſelf ſtrongly points out the propriety of the caution here given: For although ſuch inflammatory affections in the internal ſurfaces of veins are not by any means to be conſidered as frequent, yet it is certain they do now and then occur; and as the conſequences ariſing from them, eſpecially if ſuppuration is induced, muſt commonly terminate fatally, they ought certainly, by every means in our power, to be ſtrictly guarded againſt.

VII. We come now to ſpeak of ſome troubleſome conſequences which on ſome occaſions are found to occur from blood-letting, and which every operator ought to be as much as poſſible prepared to remedy. The moſt material of theſe are, ſmall tumors occaſioned by effuſions of blood from the orifice of the vein into the ſurrounding cellular ſubſtance; wounds of the artery lying contiguous to the vein; pricks of the nerves and tendons; and laſtly, inflammation, induced in the internal cavity of the vein, as we have juſt now mentioned. Theſe we ſhall now, under ſeparate heads, proceed to treat particularly of *.

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* Among other reaſons which we have given for preferring a ſpear-pointed lancet, it was obſerved, that by means of it the operation of blood-letting is attended with much leſs pain than when the broad-ſhouldered lancet is uſed: And this circumſtance of pain is a matter of ſuch importance, that nothing ſhould be omitted that can tend in any degree to diminiſh it.

In every operation it is of much conſequence to have all the neceſſary inſtruments in the moſt complete order; but in no inſtance is it of ſuch importance to attend to this circumſtance as in blood-letting. Well-tempered lancets will no doubt anſwer tolerably well, even after they have been frequently uſed; inſomuch

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SECTION II.

Of a Thrombus, or Ecchymoſis.

WE have already deſired, that in the operation of blood-letting, the member ſhould be retained in the very ſame poſture it was in when the lancet was introduced, till the whole quantity of blood intended to be taken is evacuated; but when this direction is not duly attended to, it commonly happens, that a ſmall tumor is raiſed immediately above the orifice

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that I have heard even well-employed ſurgeons aſſert, that they have uſed one or two lancets only during the courſe of many years practice, without ever having them touched by a cutler. But it is very certain, that every time a lancet is uſed, it muſt be injured more or leſs; ſo that, as the prevention of pain is with moſt patients a matter of no ſmall conſequence, I think it ought to be laid down as a fixed rule never to uſe the ſame lancet twice, without putting it into the hands of a cutler. This I have long been in the practice of, not only with lancets, but with every cutting inſtrument; and the trouble and expence attending it is very inconſiderable, when compared with the advantages reſulting from it.

fice in the vein, by the blood inſinuating itſelf into the cellular ſubſtance of the neighbouring parts. Such a tumor, when round and ſmall, is termed a Thrombus; and when more diffuſed, an Ecchymoſis.

Immediately on the appearance of ſuch ſwellings, the ligature ought to be removed from the ſuperior part of the vein; and the member being again brought into that poſture which it was in when the lancet was firſt introduced, the ligature may be again renewed; and it will thus be frequently found that a free return of blood will be induced, which commonly carries off the ſwelling altogether, or at leaſt prevents it from producing any farther obſtruction to the operation. But it does now and then happen, that theſe ſwellings come at once to ſuch a ſize, as entirely to preclude every poſſibility of finiſhing the operation at the orifice firſt made in the vein. Even here, however, the ligature ought to be immediately removed, as the moſt effectual method of preventing an increaſe of the tumor. By continuing the bandage on the vein, the blood ſtill continues to be forced in great quantities into the ſurrounding cellular ſubſtance; and by the ſame means ſuch ſwellings are induced, as now and then give a great deal of trouble, which by a contrary management might eaſily have been prevented from coming to any thing conſiderable.

In ſuch occurrences, as it is in vain to expect any conſiderable quantity of blood from the orifice firſt made, the next ſtep to be taken, is, to finiſh the operation, not by another opening in the ſame vein, which in ſuch circumſtances would ſeldom be found to bleed freely, but in any other that lies moſt convenient.

When tumors of this kind do not arrive at any great ſize, very little is neceſſary to be done for their diſperſion, as the effuſed blood is commonly ſoon abſorbed. When it is found neceſſary, however, to have recourſe to diſcutient remedies, thoſe of the aſtringent kind are by much the moſt effectual; and of this claſs brandy or any other ardent ſpirits are perhaps as uſeful as any. Compreſſes wet in a weak ſolution of crude ſal ammoniac in vinegar, and applied with a very moderate degree of preſſure, have likewiſe been found very effectual in diſcuſſing ſuch ſwellings.

Inſtances, however, do now and then occur, though by no means very frequently, of the blood collected in ſwellings of this nature being in too great quantities to be all abſorbed: and when this happens to be the caſe, as no good ſuppuration can be induced where there is nothing but red blood contained in the tumor, it ought to be immediately laid open ſo ſoon as there is reaſon to ſuppoſe that no farther diminution of ſize will probably occur from abſorption. This being done, and the coagulated blood being evacuated, the ſore falls to be treated like any ordinary wound.

But occurrences of this nature, are in general of very little importance when compared with other accidents which now and then proceed from blood-letting. The firſt of theſe we are to treat of are wounds of arteries.

SECTION III.

Of Wounds of the Arteries.

IN the ſmaller arteries, as for inſtance in any branch of the temporal artery, openings may be made without much riſk; but we know from long and repeated experience, that wounds in the larger arteries often prove hazardous, and very ſeldom heal without a great deal of trouble.

When in blood-letting we have reaſon to ſuſpect that an artery has been wounded through the orifice made in the vein, and that blood is diſcharging at the ſame orifice both from the artery and the vein, it becomes a matter of importance for an operator to know with preciſion whether it is ſo or not. There is only one method by which a complete degree of certainty can be obtained on this point, and it is this.

When the blood is diſcharged from the vein only, if a degree of preſſure be applied both immediately above and below the orifice ſufficient for compreſſing the ſides of the vein together, all farther evacuation of blood ſhould inſtantly ſtop, even though the preſſure is not ſo conſiderable as to affect the artery below; but, on the contrary, if part of the blood is thrown out from the wounded artery, this preſſure upon the vein, inſtead of putting a ſtop to the diſcharge, ſhould rather tend to make it more conſiderable. When at the ſame time the blood is diſcharged *per ſaltum*, this will no doubt ſerve as a corroborating circumſtance: But this teſt of itſelf, we may remark, is by no means ſo deciſive as is commonly imagined; for, an orifice made in a vein lying directly above and immediately contiguous to a conſiderable artery, receives the influence of the arterial pulſation to ſuch degree, as to diſcharge blood very nearly in the ſame manner as if the artery itſelf was cut. No other proof, however, is neceſſary of the artery being wounded, than the one we have already mentioned; for, if after the vein is thoroughly compreſſed both above and below the orifice, blood ſtill continues to be diſcharged in great quantities and with any conſiderable force, our ſuſpicions of the artery being wounded are then reduced to the utmoſt degree of certainty.

Allowing this to be the caſe, that in ſuch circumſtances we are rendered certain of the lancet having pierced the artery, what remedy ought we to have recourſe to? Not the means uſually adviſed, but the very reverſe.

In all ſuch occurrences, we are conſtantly directed to tie up the part with as much firmneſs as poſſible, in the firſt place with different compreſſes placed over the orifice of the vein; and leaſt theſe ſhould not produce a ſufficient degree of preſſure, a piece of money or other hard ſubſtance is deſired to be added, and the whole to be ſecured with a roller very tightly applied. But what effect ought we reaſonably to expect from much preſſure applied in this manner? We cannot ſuppoſe it was ever intended that any preſſure of this kind ſhould be ſo conſiderable as to compreſs the artery itſelf; for by that means when the principal artery of a part is wounded, a total ſtop would be put to the circulation in the whole limb: And if the preſſure, on the contrary, is to be applied in ſuch a degree as to compreſs the ſides of the veins only, one certain effect of this muſt be, to occaſion a conſiderable reſiſtance to the flow of blood from the artery; and that fluid being thus obſtructed in its natural courſe, will neceſſarily be much more readily effuſed at the opening in the artery, than if the veins had been all left free and pervious to receive and tranſmit it.

In all ſuch caſes, therefore, inſtead of applying much preſſure, we ought to attempt every means for relaxing the veins to the utmoſt; and in order to command the blood, the lips of the wound ſhould be laid together, and retained there by ſtraps of adheſive plaſter only, without any bandage whatever. And as there is not a more effectual method of relaxing the ſyſtem at large, and the vaſcular ſyſtem in particular, than by diſcharging large quantities of blood very quickly, ſo ſoon as it is known that an artery has been accidentally opened, it ought to be immediately determined to evacuate by the orifice newly made, as much blood as the patient can eaſily bear to loſe. By theſe means, and by enjoining ſtrict attention to reſt of body in order to prevent as much as poſſible the arterial ſyſtem from being thrown into much exertion; and by keeping the body cool, with the uſe of gentle purgatives, a low diet, and farther blood-lettings when neceſſary; there may always be at leaſt ſome chance of ſuch wounds in arteries being brought to reunite: Whereas, a contrary management, in which much preſſure upon the veins is adviſed, muſt univerſally do miſchief, by forcing the artery to empty itſelf at the only paſſage the blood in ſuch circumſtances can be diſcharged at, *viz.* the opening newly made by the lancet; and by ſuch treatment many aneuriſmal ſwellings, I am confident, have been produced, which by the management now pointed out might eaſily have been prevented.

In caſes of wounded arteries, however, it will frequently happen, that no treatment whatever will ſucceed; the orifice in the artery will not reunite, and blood in conſiderable quantities is effuſed into the contiguous parts. Even in this ſtate of the complaint, ſtrong preſſure is adviſed, with a view to diſſipate the tumor: But unleſs the ſwelling is of a very ſoft nature, and unleſs the blood contained in it ſtill remains in a ſtate of fluidity, no preſſure whatever can have any influence in diſcuſſing it; for, whenever the accumulated blood has acquired any conſiderable degree of hardneſs, we cannot ſuppoſe that preſſure will have any effect in driving it back by the paſſage from whence it originally came; nor does it appear, that in ſuch circumſtances, compreſſion is of any uſe in forwarding the abſorption of extravaſated blood. From theory alone we might readily be induced to draw this concluſion, but in fact we do not know a ſingle inſtance in which preſſure in ſuch caſes appeared to be productive of any advantage.

There is indeed a particular ſpecies of ſwelling, which now and then occurs on an artery being in this manner wounded by a lancet that has previouſly paſſed through a neighbouring vein, and in which moderate preſſure has proved ſerviceable. When an artery thus wounded, lies quite contiguous to the correſponding vein, the opening between the two veſſels on ſome occaſions continues pervious, ſo as to produce a direct communication between the one and the other; and the vein in this manner receiving the full force of the arterial pulſation, at the ſame time that its coats are not poſſeſſed of a firmneſs ſufficient to reſiſt it, a ſwelling of the vein comes of courſe to be produced. In all ſuch inſtances, moderate preſſure, we may readily ſuppoſe, muſt be of very great uſe, by ſerving as a ſupport to the diſtended vein, and by thus preventing any farther increaſe to its bulk; but in no other ſwelling ariſing from blood effuſed from an artery can preſſure be of any uſe; on the contrary indeed, for the reaſons already enumerated, there is great cauſe for ſuſpecting that it has frequently done much miſchief. When we are rendered quite certain that an artery has been opened, and that the tumor produced by it is owing to blood collected in the cellular membrane around it, if keeping the limb in an eaſy relaxed poſture and the veins perfectly free from preſſure, together with the other means formerly pointed out, do not prevent a farther increaſe of the ſwelling, no other mode of treatment with which we are acquainted will have much influence.

The tumor ſtill continuing, by the communication between it and the artery being conſtantly kept up, and none of the means employed for its diſperſion having any influence, the diſorder in that ſtate is to be conſidered as forming a ſpecies of aneuriſm, an ailment of which we will treat more particularly afterwards.

SECTION IV.

Of Wounds or Pricks in the Nerves and Tendons.

THE diſorder we have now been deſcribing, *viz.* wounds of the arteries, as well as ſimilar affections of the tendons, ought never to happen in the hands of a ſurgeon who pretends to any tolerable degree of ſteadineſs; for, as the arteries and tendons are both parts which previous to the operation may be eaſily diſtinguiſhed by the finger, ſo as that their ſituation may be aſcertained with exactneſs, it muſt always be the fault of the ſurgeon, if the point of his lancet is not ſo directed as to avoid them. One principal cauſe of ſuch accidents occurring in blood-letting, is, as we have already ſhown, the ordinary practice of dipping the point of the lancet, after it has got acceſs to the cavity of the vein. This, however, we have demonſtrated to be always unneceſſary, and in many inſtances to be productive of very pernicious effects; but although, by proper attention to this part of the operation, we may always with certainty avoid the arteries and tendons; yet it may be ſaid, that the nerves, which in general are ſo ſmall as not to be previouſly diſtinguiſhed, run at all times a great riſk of being wounded, and that the accidents which now and then occur from wounded nerves, are well known to be productive of as dreadful conſequences as have ever ſucceeded to the operation of blood-letting.

But although the nerves from the ſmallneſs of their ſize cannot previouſly be diſtinguiſhed by the fingers; yet, if ſufficient attention be given to the direction of the point of the lancet, ſo as to avoid with certainty carrying the inſtrument through the back part of the vein, the ſame means which tend to ſecure the arteries and tendons, will with almoſt equal ſureneſs prove a ſafeguard to the nerves: For, if the operator enters his lancet, as he ought always to do, on the ſuperior part of the vein, and if he does not cut the vein entirely acroſs by puſhing the lancet through to the oppoſite ſide of it, he can never run any riſk of wounding the contiguous nerves; for the conſtant courſe of theſe nerves lying ſo near to the different veins, is, either immediately below the veins, or at leaſt ſo far down upon their ſides as to be out of all riſk of being wounded, if the lancet is made to enter where it ought to do, and it muſt always be the ſurgeon's fault if the inſtrument is puſhed out at the oppoſite ſide of a vein. I may venture to aſſert, that no inconvenience of this kind ever happens, from the wound made by a lancet in entering the anterior part of a vein: It is always on the oppoſite ſide of the vein that any miſchief of this kind is produced, by the lancet, as we have already obſerved, being puſhed entirely through; a ſituation it ought never to be in, and which every ſurgeon ought to have ſteadineſs enough to to prevent.

But although a very ordinary degree of caution would eaſily prevent every occurrence of this nature, and although, when accidents of this kind do happen, the ſurgeon is almoſt in every inſtance to blame; yet experience has on different occaſions evinced, that, either from the want of attention, or from the operator not being poſſeſſed of a ſufficient degree of ſteadineſs, however eaſily ſuch inconveniences ought to be prevented, yet ſtill they do frequently occur. Nerves, and even tendons, are ſometimes pricked, and the dreadful train of ſymptoms which ſuch accidents commonly produce are almoſt ſure to ſucceed.

It ſometimes happens immediately on the introduction of the lancet, that the patient complains of a moſt exquiſite degree of pain; and when this occurs, we may reſt aſſured that either a nerve or tendon has been wounded. On ſome occaſions, by proper management, ſuch as evacuating a conſiderable quantity of blood at the orifice newly made, by keeping the part at perfect reſt, and preſerving the patient in as cool a ſtate as poſſible, the pain at firſt complained of will gradually abate, and at laſt go off entirely without any bad conſequence whatever.

At other times, however, this pain which occurs inſtantaneouſly on the introduction of the lancet, inſtead of abating, begins ſoon to increaſe; a fullneſs, or ſmall degree of ſwelling, takes place in the parts contiguous to the wound; the lips of the ſore become ſomewhat hard and inflamed; and in the courſe of twenty-four hours or ſo from the operation, a thin watery ſerum begins to be diſcharged at the orifice.

If, by the means employed, relief is not ſoon obtained, theſe ſymptoms generally continue in nearly the ſame ſtate, for two, or perhaps three days longer. At this time the violent pain which at firſt took place becomes ſtill more diſtreſſing, but inſtead of being ſharp and acute as before, it is now attended with the ſenſation of a burning heat, which ſtill goes on to increaſe, and proves during the whole courſe of the ailment a ſource of conſtant diſtreſs to the patient. The fullneſs and hardneſs in the lips of the wound begin to increaſe, and the ſwelling in the neighbouring parts gradually extends over the whole member;

from the foot upwards over the thigh, when the operation has been done in the lower extremity; and from the elbow down the fore-arm, and along the humerus over to the pectoral muſcle and other contiguous parts, when the accident has occurred at the uſual place of blood-letting in the arm.

The parts at laſt become exceedingly tenſe and hard; an eryſipelatous inflammatory colour frequently appears over the whole member; the pulſe by this time has generally become very hard and quick; the pain is now intenſe, the patient exceedingly reſtleſs; twitchings of the tendons occur to a greater or leſſer degree; on ſome occaſions, a locked jaw and other convulſive affections ſupervene; and, all theſe ſymptoms continuing to increaſe, it moſt frequently happens, that the dreadful torture under which the patient has been groaning, is at laſt terminated by death.

Blood-letting, from being ſo very generally practiſed, may by many be conſidered as an operation by no means either ſo difficult in execution, or ſo dreadful in its conſequences, as is here repreſented. Such inſtances indeed are not to be conſidered as frequent occurrences; but they happen often enough to convince us of the neceſſity of very great caution in this operation. In the courſe of my experience I have known ſeveral inſtances where the conſequences of blood-letting have proved fatal, and the dreadful train of ſymptoms we have already enumerated uniformly occurred in all of them.

Different opinions have prevailed reſpecting the cauſe of theſe ſymptoms: By ſome they have been imputed to wounds of the tendons; and by others the tendons are ſuppoſed to be ſo entirely deſtitute of ſenſibility, as to be quite incapable of producing ſo much diſtreſs; ſo that wounds of the nerves they conſider in all ſuch occaſions as the true cauſe of the various ſymptoms we have mentioned.

One or other of theſe ideas continued to be the only ſource for explaining the various phenomena found to occur in this malady, till a different opinion was at laſt ſuggeſted by the ingenious Mr John Hunter of London. Mr Hunter ſuppoſes, that all the dreadful ſymptoms found now and then to be induced by the operation of blood-letting, may be more readily accounted for, from an inflamed ſtate of the internal ſurface of the vein, than from any other cauſe. Such a ſtate of the vein he has often traced in horſes that have died of ſuch ſymptoms from venæſection, where the internal coat of the vein was always found much inflamed, not only in the neighbourhood of the part where the orifice was made; but on ſome occaſions the inflammation extended along the whole courſe of the vein, and ſeemed at laſt to reach the heart itſelf. Some inſtances too have occurred, of the ſame appearances in the human body, where the veins after death were found in a ſtate of high inflammation. And on other occaſions, inflammation having in this manner been once excited, has been known to terminate in ſuppuration; and the matter thus produced, being in the courſe of circulation carried to the heart, Mr Hunter ſuppoſes that in ſuch caſes death may have been induced by that cauſe alone.

There can be no reaſon to doubt the fact held forth by Mr Hunter, that in ſuch inſtances, the vein in which the orifice has been made, has frequently after death been found greatly inflamed: But however ingenious his arguments may be, for concluding that this ſtate of the vein is the original cauſe of all the bad ſymptoms enumerated; and although we muſt allow, that ſuch an inflammatory affection of a vein muſt have a conſiderable influence in aggravating the various ſymptoms previouſly induced by other cauſes; yet I think we may very fairly conclude, that it could not probably in any one inſtance be able to account with ſatisfaction for their firſt production.

In all the inſtances of this dreadful complaint which I have had an opportunity of ſeeing, the patient at the very inſtant of the operation felt a very unuſual degree of pain. In ſome caſes, the violence of the pain was almoſt unſupportable: Now this we can never ſuppoſe to have been produced by the mere puncture of a vein; for although the coats of veins are not perhaps entirely deſtitute of feeling, yet we know well, that they are not endowed with ſuch a degree of ſenſibility as to render it probable ſuch intenſe pain could ever be induced by their being punctured in any way whatever. This inflamed ſtate of the veins therefore, as detected by Mr Hunter after death, muſt be conſidered rather as being produced by, than as being productive of, ſuch affections; and that ſuch ailments ſhould frequently produce an inflammation of the contiguous veins, is a very probable conjecture. In the courſe of forty-eight hours or ſo from the operation, when the febrile ſymptoms are juſt commencing, ſuch a degree of hardneſs and evident inflammation is induced over all the parts contiguous to the orifice, that it would be ſurpriſing indeed, if the vein, which is thus perhaps entirely ſurrounded with parts highly inflamed, ſhould eſcape altogether.

We ſhall therefore proceed upon the ſuppoſition of this inflamed ſtate of the veins being a conſequence, rather than the cauſe, of ſuch ailments; and of courſe we now revert to one or other of the opinions long ago adopted on this ſubject, that all the train of bad ſymptoms found on ſome occaſions to ſucceed to venæſection, proceed either from the wound of a nerve or of a tendon.

That a partial wound of a nerve will now and then produce very diſtreſſing ſymptoms, no practitioner will deny: But it has been attempted to be ſhown, as we have already remarked, that tendons are almoſt totally deſtitute of ſenſibility; and it has therefore been ſuppoſed, that their being wounded, can never account for the various ſymptoms known to occur in ſuch caſes.

There is great reaſon, however, to think, that in different inſtances the ſame train of ſymptoms have been induced by different cauſes; that in one inſtance a wounded nerve, and in others pricks of the tendons, have given riſe to them. Being decidedly of this opinion myſelf, I think every perſon muſt be ſo, who has paid much attention to the ſubject; but as the ſame method of treatment proves equally applicable, whether the diſeaſe has originated from the wound of a nerve or of a tendon, we do not think it neceſſary to enter here into a more minute diſcuſſion of the queſtion. Having already in a former ſection ſhown how ſuch accidents may be almoſt always avoided, we ſhall now proceed to conſider the means beſt calculated for preventing the ſymptoms coming to a great height, when it is diſcovered that either from inadvertence or any other cauſe the miſchief has actually happened.

Whenever a patient at the time of the operation complains of a very exquiſite degree of pain, we may always be certain that ſome parts have been wounded which ought not to have been touched. When this unfortunately happens, if proper attention

tion be given immediately, much may be done to obviate the acceſſion of thoſe ſymptoms which ſuch a cauſe is otherwiſe ſure to induce.

In order therefore to prevent as much as poſſible the conſequent inflammation and other ſymptoms which uſually enſue, a conſiderable quantity of blood ſhould be immediately diſcharged at the orifice juſt made; the limb for ſeveral days at leaſt, ought to be kept in a ſtate of perfect reſt, care being at the ſame time taken that the muſcles of the part be all preſerved in as relaxed a ſtate as poſſible; the patient ſhould be kept cool; on a low diet; and, if neceſſary, gentle laxatives ought to be adminiſtered.

By ſuch management alone, the fatal ſymptoms we have enumerated, may frequently be prevented; and when they do occur in caſes where the above precautions have not been taken, they may be conſidered to be as much the conſequence of negligence in the after treatment, as of any thing peculiarly bad in the nature of the original accident.

When notwithſtanding, however, of the means recommended, the ſymptoms, inſtead of diminiſhing, rather become more violent, if the lips of the orifice turn hard and more inflamed, if the pain becomes more conſiderable, and eſpecially if the ſwelling begins to ſpread, other remedies come then to be indicated. In this ſtate of the complaint, topical blood-letting, by means of leeches applied as near as poſſible to the lips of the wound, frequently affords much relief; and when the pulſe is full and quick, it even becomes neceſſary to evacuate large quantities of blood by opening a vein in ſome other part.

The external applications uſually employed in this ſtate of the complaint, are, warm emollient fomentations and poultices, and in ſimilar affections of other parts no remedies with which we are acquainted would probably be found more ſucceſsful; for as warm fomentations and cataplaſms prove in general very powerful agents in the formation of pus, and as nothing would ſo certainly relieve the ſymptoms which uſually occur here as a free ſuppuration, applications of this nature were made therefore with ſome apparent propriety: But from all the experience I have had in affections of this kind ſucceeding to blood-letting, I am now perfectly convinced, that little or no advantage is ever to be expected from remedies of this claſs. On the idea of being able to induce a free and kindly ſuppuration on the wound, and having great reaſon to think from its effects in ſimilar caſes, that all the ſymptoms would be thereby rendered more mild, I muſt own that in ſeveral caſes I went into the uſe of applications of this kind to the greateſt poſſible degree. Unfortunately, however, the advantages reſulting from them, never anſwered my expectations; ſo that at laſt I was induced to make trial of a very different ſet of remedies.

Although at the time of thus uſing applications of the warm emollient kind, I did not attend particularly to the cauſe of their failure, yet I now think that this circumſtance may be very eaſily accounted for. The parts here principally concerned being almoſt entirely membranous, and being therefore, as we have elſewhere ſhown*, incapable of yielding purulent matter, a continued courſe of warm applications, inſtead of producing the wiſhed for effect, muſt in all probability rather tend to aggravate all the ſymptoms; for when ſuch remedies do not induce a free ſuppuration, the heat they convey to the parts, by acting as a perpetual ſtimulus, muſt rather tend to increaſe the inflammation: And in fact we find, in the complaint now under conſideration, that all ſuch applications, inſtead of being productive of any advantage, rather do harm. The heat of the part is here one of the moſt diſtreſſing ſymptoms; ſo that, inſtead of affording relief, warm emollient applications rather tend to augment this very tormenting ſource of uneaſineſs. The lips of the wound, from not being capable of producing a good ſuppuration, are by the additional heat applied to them through the medium of ſuch applications, rendered ſtill more hard, ſwelled, and of courſe more painful, and the ſwelling of the contiguous parts alſo becomes more diffuſed over the reſt of the member.

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* *Vide* Treatiſe on Inflammation and its conſequences.

By Ambroſe Parré, Dionis, Heiſter, and others, inſtead of emollient remedies, oil of turpentine, tincture of myrrh, and other heating applications, are recommended. That theſe would not prove effectual, I cannot from experience pretend to ſay; for, ſuſpecting their powerful ſtimulating effects might in caſes of this nature prove too irritating, for parts already by diſeaſe rendered exquiſitely ſenſible, I have never, I muſt own, ventured to uſe them: But I can from repeated experience aſſert, that cooling aſtringent applications, afford much more eaſe, and upon the whole, in all ſuch ailments, prove much more effectual, than warm emollients; and of this claſs the moſt effectual I have ever uſed, are the ſaturnine applications. The parts chiefly affected being alternately covered with cloths wet with a ſolution of ſaccharum ſaturni, and pledgits ſpread with Goulard's cerate, are kept more cool and eaſy than by any other remedy I have ever happened to uſe.

In all ſuch caſes therefore, ſo ſoon as a number of leeches proportioned to the violence of the ſymptoms have been applied to the parts chiefly affected, and have diſcharged a ſufficient quantity of blood, the ſwelling ought to be covered with pieces of ſoft linen wet in the ſaturnine ſolution; and theſe being kept conſtantly moiſt for the ſpace of a few hours, ſhould be ſucceeded by Goulard's cerate; and thus every part in any degree affected, ought to be alternately covered with one or other of theſe applications, ſo long as any degree of ſwelling remains.

The febrile ſymptoms which occur, muſt at the ſame time be attended to, by keeping the patient cool; on a low diet; preſerving a lax ſtate of the bowels; and, if neceſſary, farther quantities of blood ought to be evacuated.

For the violence of the pain, which is ſometimes ſo exceſſive as to deſtroy the patient's reſt entirely, opiates ought to be freely exhibited; and when twitchings of the tendons, and other convulſive ſymptoms ſupervene, medicines of this kind become ſtill more particularly neceſſary. In order, however, to have a proper influence in this ſtate of the complaint, opiates ought to be given in very full doſes; otherwiſe, inſtead of anſwering any good purpoſe, they conſtantly tend to aggravate the different ſymptoms, not only by increaſing the heat and reſtleſſneſs, but by having an evident influence in rendering the ſyſtem more ſuſceptible than it was before of the pain and other diſtreſſing effects produced upon it by the wound: Whenever opiates therefore are in ſuch circumſtances employed, the doſes ought always to be conſiderable.

It often happens, however, in this very alarming diſorder, either from neglecting the matter altogether on the accident firſt happening, as is too frequently the caſe, or from an improper ſubſequent treatment by warm emollient applications, that opiates and all the other remedies enumerated are afterwards had recourſe to, without any advantage whatever: The fever, pain, and ſwelling of the parts continuing, convulſive affections of the muſcles at laſt occur; all tending to indicate the moſt imminent danger. In this ſituation of matters, if we have not immediate recourſe to ſome effectual means, the patient will ſoon fall a victim to the diſorder; and the only remedy from which in theſe circumſtances much real advantage is to be expected, is a *free and extenſive diviſion* of the parts in which the orifice producing all the miſchief was at firſt made. We know well, from the repeated experience of ages, that much more pain and diſtreſs of every kind is commonly produced by the partial diviſion either of a nerve or of a tendon, than from any of theſe parts being at once cut entirely acroſs. Now, the intention of the operation here recommended,

mended, is, to produce a complete diviſion of the nerve or tendon we ſuppoſe to have been wounded by the point of the lancet, and which we conſider as the ſole cauſe of all the ſubſequent diſtreſs.

The operation now recommended being attended with a good deal of pain, and being put in practice for the removal of ſymptoms from which it is perhaps difficult to perſuade the patient that much danger can occur, all the remedies we have mentioned ſhould be firſt made trial of, before it is propoſed: But at the ſame time, care ought to be taken, that the diſorder is not allowed to proceed too far before we have recourſe to it; for, if the patient ſhould be previouſly much weakened by the feveriſh ſymptoms having continued violent for any length of time, neither the remedy now propoſed, nor any other with which we are acquainted, would probably have much influence. So ſoon therefore as the courſe already preſcribed has been fairly tried, and is found to be inadequate to the effects expected from it, we ought immediately to have recourſe to a free diviſion of the parts chiefly affected; and the manner of doing it is this.

As all the contiguous parts are now ſuppoſed to be much ſwelled and in a ſtate of high inflammation, it is impoſſible to get proper acceſs either to the nerve or tendon, but by means of a large and extenſive inciſion; and as this cannot be effected without ſome riſk, of opening at leaſt ſome large branches of arteries, the firſt ſtep to be taken in this operation is, to ſecure the parts, againſt the effects of ſuch an occurrence, by the application of the tourniquet on the ſuperior part of the member. This precaution is neceſſary, not only for guarding againſt the loſs of blood which would enſue from a diviſion of any of the large arteries, but for preventing interruption during the operation, which would otherwiſe occur from a conſtant diſcharge of blood from the ſmaller veſſels. The tourniquet indeed is more particularly requiſite with a view to the prevention of this laſt inconvenience, than for any other reaſon;

ſon; for although it is proper by means of it to guard againſt the effects to be expected from a diviſion of any of the large arteries, yet with proper caution ſuch an occurrence may in moſt caſes be very eaſily avoided.

The tourniquet then, being properly applied, a tranſverſe inciſion ſhould be made with a common ſcalpel*, upon the parts chiefly affected, and it ought to run in a direction exactly acroſs the original orifice in the vein.

In every ſurgical operation, raſhneſs is undoubtedly improper, and is often productive of diſagreeable conſequences; but unneceſſary caution, which almoſt conſtantly proceeds from the operator being inaccurate and confuſed in his ideas of the anatomy of the parts, generally produces ſuch a degree of timidity, as ultimately proves more hurtful to the patient, than even an unuſual degree of forwardneſs; for in every operation where an inciſion is neceſſary, if the firſt cut is not made fully ſufficient for the intended purpoſe, all the ſubſequent ſteps of it are commonly either much retarded, or perhaps rendered entirely ineffectual.

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* For the moſt proper form of a ſcalpel, ſee Plate IV.

In no operation whatever, is it more neceſſary than in this, to act with proper freedom in laying the parts ſufficiently open by the external inciſion. A ſmall inciſion puts the patient to nearly the ſame degree of pain as a larger cut, and it has this material inconvenience, that the ſurgeon cannot go on with the future ſteps of the operation, with ſo much eaſe and expedition as when an extenſive opening is made at firſt.

The external teguments being thus freely divided, the operator is now to proceed in a gradual manner, making one ſlight inciſion after another, taking care, if poſſible, to avoid wounding either the larger arteries or veins; and he is to go on in this way, to endeavour to detect the wounded nerve; or if there is no poſſibility of doing ſo, even by great caution and nicety in wiping away with a ſpunge every particle of blood as he goes along, he muſt ſtill continue to proceed in this ſlow gradual manner, till he has divided every part between the ſkin and perioſteum; the tendons, larger arteries, and veins, excepted.

At this time the tourniquet ſhould be looſened; and, in all probability, the patient will be found to expreſs much ſatiſfaction at what has been done: For, if the part is thus divided which originally had been pricked by the lancet, and from whence all the ſubſequent diſtreſs proceeded, an immediate relief will now be obtained; but on the contrary, if the pain ſtill continues violent, we are thereby rendered almoſt certain of the miſchief lying altogether in one or other of the tendons. An accurate examination, therefore, muſt now be made, by clearing the parts effectually with a ſpunge; and that tendon lying moſt contiguous to the vein in which the orifice was made, will in all probability be found either wounded, or in an evident ſtate of inflammation; but at all events, whether any ſuch appearances are detected or not, no heſitation whatever ſhould occur as to the propriety of dividing that tendon which lies moſt contiguous to the vein; or if two or even three tendinous extremities ſhould happen to lie in the way, and to be all therefore equally liable to ſuſpicion, they ought all undoubtedly to be cut entirely acroſs; and this being properly effected, it will ſeldom occur that much relief is not immediately derived frcm it: And at any rate, this being done, every attempt will have been made from which we could expect any benefit to ariſe.

The parts having been thus freely divided, the tourniquet muſt now be made as ſlack as poſſible; and whatever arteries have been wounded, muſt be properly ſecured. The parts are then to be covered with ſoft eaſy dreſſings, and to be afterwards treated in the ſame manner as a wound from any other cauſe.

The remedy here recommended, if every circumſtance is not duely attended to, may probably be conſidered as ſevere; for ſuch an inciſion carried to ſuch a depth, muſt no doubt be attended with much pain; and the diviſion of one or more tendons runs a conſiderable riſk of producing at leaſt a partial lameneſs, and that too probably for life, of the whole member: But, if we conſider for a moment the importance of the object in view, every conſideration of this kind muſt immediately vaniſh. It is not a trifling advantage we are in purſuit of, nor can ſuch a painful operation be ever with propriety had recourſe to but from real neceſſity. In the preſent inſtance, however, it is clear that the patient's life is in all probability to depend on the event of this operation; ſo that the moſt timid operator, if he is at all capable of reflection, muſt admit the propriety of putting it in practice; and from the event of almoſt every caſe of this nature, that has once advanced to the length for which we have recommended the operation in queſtion, it may with great certainty be pronounced, that every patient in ſuch circumſtances is in the outmoſt hazard of his life; ſo that in ſuch a deſperate ſituation, no remedy that affords any tolerable chance of a recovery, however painful it may be, can with propriety be condemned.

From reaſoning alone, we would readily conclude, that in all ſuch circumſtances no remedy whatever would more probably prove ſucceſsful than the operation we have now adviſed; but when the propriety of the meaſure is enforced by the ſucceſsful iſſue of repeated trials, no argument adduced againſt it ought to meet with much attention. In different occurrences of this kind, of leſs importance, I have ſeen much advantage enſue from the practice here recommended; but in one inſtance, where the patient had been blooded in the median cephalic vein of the arm, the diſorder had got to ſuch a height, and had ſo obſtinately reſiſted every other remedy, that there was every reaſon to ſuppoſe death muſt have enſued, had it not been for the effects of a free and very deep inciſion made into the parts affected. The patient, from being evidently in very great hazard, and in exquiſite pain, experienced almoſt inſtantaneous relief; and the ſwelling, which had previouſly reſiſted the effects of every other remedy, and had even continued to ſpread, began ſoon to abate, and a perfect recovery was obtained in a much ſhorter ſpace of time than could have been expected.

There is not therefore a point in ſurgery that I am more ſatisfied of, than the propriety of ſuch an operation in all ſuch deſperate caſes as the one we have been treating of; but to ſuch as have not happened to meet with occurrences of this nature, the remedy propoſed will not only appear to be too violent for the diſeaſe, but they will alſo be induced to conſider the length of diſcuſſion here gone into to be much more prolix than is neceſſary: A ſingle inſtance, however, of the dreadful ſymptoms now and then induced by accidents of this kind, will be fully ſufficient to convince any man, that the ſubject now under conſideration is perhaps one of the moſt important in the department of ſurgery.

All that has hitherto been ſaid on blood-letting relates to the operation in general: We ſhall now proceed to conſider the operation as it is put in practice in particular parts; and firſt of blood-letting in the arm.

SECTION V.

Of Blood-letting in the Arm.

BLOOD-LETTING is more frequently practiſed on the fore-part of the arm at the joint of the elbow, than in any other part ot the body. The veins are in general more conſpicuous in this place; but no other reaſon can be aſſigned for this preference: On the contrary, the near contiguity of nerves, tendons, and of large arteries, to theſe veins, makes the operation more hazardous here than in any other part. From this circumſtance, therefore, I have often been induced to conſider the fixing on this part for the ordinary operation of blood-letting, as a very capital error; and the more eſpecially as blood may be drawn from veins in other parts with the ſame

caſe

eaſe as from thoſe of the arm, and with much leſs danger; particularly from the veins of the neck, from thoſe of the under part of the legs, ankles and feet.

Blood-letting in the lower extremities has indeed in general been confined to a particular ſet of diſorders chiefly to thoſe of females: But no good reaſon, I imagine, can be aſſigned for this; for it is now well known, that, in general blood-letting, the place from whence the blood is drawn, is of little importance, and that the effects of the operation depend almoſt ſolely upon the quantity of blood that is diſcharged in a longer or ſhorter ſpace of time.

Blood-letting at the arm may be ſafely performed by a ſurgeon of ſteadineſs and attention, as in the hands of ſuch a man there can be little or no riſk of the lancet going deeper than the vein, and in this caſe nothing bad can enſue. But, in ordinary practice, I ſhould at all times rather incline to have the operation done in ſome other part. It may almoſt always be done with eaſe in the feet and ankles; and if the operation is properly performed, the ſame quantity of blood may be drawn from the veins of theſe parts, as from veins of an equal ſize in any other part of the body.

But whether the idea now ſuggeſted ſhould ever be generally adopted or not, this is ſo far evident, that if the cautions we have pointed out are proper on every occaſion when venæſection is practiſed, they are neceſſarily much more ſo when the operation is done in the arm, where the veins lie ſo very contiguous to parts, which when they happen to be wounded are ſure to be productive of very alarming ſymptoms.

Having already conſidered with minuteneſs the various ſteps of the operation of blood-letting, ſo far as they relate to it in a general way; in order to avoid repetitions, nothing will be now pointed out but what is particularly required in performing this operation in the arm.

In applying the ligature for the ſtoppage of the circulation, it ought to be placed about an inch or an inch and half above the joint of the elbow; and, in order to prevent the ends of it from interfering with the lancet, the knot ſhould be made on the outſide of the arm. In general, one knot might anſwer; but a ſlip-knot being made above the firſt, renders it more ſecure, and it is very eaſily done.

In forming the choice of a vein from whence blood is to be taken, the general rules we have already laid down upon this point, muſt be here particularly attended to. That vein which appears moſt conſpicuous, at the ſame time that it rolls leaſt under the ſkin, ſhould in general be fixed upon; but when an artery is found to lie immediately below, and quite contiguous to ſuch a vein, the operator, if he is not perfectly ſatisfied with his own ſteadineſs, ought rather to take ſome other. In general, however, the artery lies ſo low in this place, that the median baſilic vein, under which it commonly runs, may be opened with perfect ſafety; and as this vein in general appears more conſpicuous than any of the others, probably from the continued pulſation of the artery below obſtructing in ſome meaſure the paſſage of its contents, it is in this reſpect therefore more properly calculated for this operation than any of the others. Other circumſtances occur too, which render the median baſilic preferable to the cephalic or median cephalic veins for the operation of blood-letting. The former, viz. the median baſilic, is leſs deeply covered with cellular ſubſtance, and by lying towards the inner part of the arm it is more thinly covered with the tendinous expanſion of the biceps muſcle, than either of the others. From theſe circumſtances the operation is always attended with leſs pain when done in this vein, than in any of the others; and that conſideration alone ought to have a good deal of influence in determining the choice of an operator.

In blood-letting at this part of the arm, although the operation may be done with the right hand either upon the right or left arm of the patient; yet it is much more neatly done by performing with the right hand upon the right arm, and with the left hand upon the left arm of the patient; and whoever attempts the contrary, muſt find that it cannot be done but in a very aukward manner, as the operator can never in any other way apply his hand properly to the patient's veins.

In very corpulent people, it ſometimes happens, that all the larger veins lie ſo deep as not to be diſcovered by the eye; but when they are ſenſibly felt by the fingers, even although they cannot be ſeen, they may be always opened with freedom. In a few inſtances, however, it is the caſe, that they can neither be diſtinguiſhed by the eye, nor by the finger: In ſuch a ſituation, as they may in general be met with about the wriſt, or on the back part of the hand, the ligature ſhould be removed from the upper part of the arm; and being applied about half-way between the elbow and wriſt, the veins below will thereby be brought into view; and wherever a vein can be evidently obſerved, there can be no danger in having recourſe to the operation.

SECTION VI.

Of Blood-letting in the Jugular Vein.

FOR inflammation of the throat, diſorders of the eyes, and other affections of the head, when it is wiſhed to evacuate blood from veſſels near to the parts affected, it is frequently judged proper to open the external jugular veins; and the manner of doing it is this.

There is only one ramification of this vein, viz. its principal poſterior branch, which can eaſily be brought ſo much into view, as to be with propriety opened; and even this lies deeply covered with parts, not only with the ſkin and cellular ſubſtance, but with the fibres of the platiſma myoides muſcle, ſo that a conſiderable degree of preſſure becomes neceſſary in order to raiſe it to any height. With a view to produce this, the operator's thumb is commonly adviſed to be placed upon the vein, ſo as to compreſs it effectually about an inch or inch and half below where the opening is to be made. This, however, ſeldom proves ſufficient for the purpoſe, as the blood, on being ſtopped in its progreſs through this branch, eaſily finds a paſſage to the other veins; ſo that unleſs the principal vein on the other ſide of the neck is alſo compreſſed, the vein to be opened can never be fully diſtended. In order to effect this, a firm compreſs of linen ſhould be applied on the largeſt vein on the oppoſite ſide of the neck; and an ordinary garter, or any other proper ligature, being laid directly over it, ſhould be tied with a firm knot below the oppoſite arm-pit; taking care to make ſuch a degree of preſſure, as to put an entire ſtop to the circulation in the vein, which in this way may be eaſily done without producing any obſtruction to the patient's breathing.

This being done, and the patient's head being properly ſupported, the operator, with the thumb of his left-hand, is now to make a ſufficient preſſure upon the vein to be opened, and with the lancet in his right-hand is to penetrate at once into the vein; and, before withdrawing the inſtrument, an orifice ſhould be made large enough for the intended evacuation. It may be proper to obſerve, that a more extenſive opening ought always to be made here than is neceſſary in the arm, otherwiſe the quantity of blood is generally procured with difficulty: And beſides, there is not the ſame neceſſity for caution on this point here, that there is in the arm; for it ſeldom or never happens, that any difficulty occurs in this ſituation, in putting a ſtop to the blood after the preſſure is removed from the veins; all that is commonly neceſſary for this purpoſe being a ſlip of adheſive plaſter without any bandage whatever.

In order to bring the vein more clearly into view, ſo as afterwards to be able to open it with more exactneſs, it has been recommended, that the ſkin, cellular ſubſtance, and muſcular fibres covering the vein, ſhould be previouſly divided with a ſcalpel before attempting to puſh the lancet into it. There is not, however, any neceſſity for this precaution, as it rarely happens that any difficulty is experienced in procuring a free diſcharge of blood by opening the vein and teguments at once in the manner directed: And it is here, as in every inſtance where it is neceſſary to take blood by a lancet, if it is not done at once, the patient is much diſappointed, and is ſure to attribute the failure entirely to a fault in the operator.

SECTION VII.

Of Blood-letting in the Ankles and Feet.

WHAT has already been ſaid on the operation of blood-letting, renders it quite unneceſſary to be here in any degree minute. When blood is to be diſcharged from the veins of theſe parts, it will be readily underſtood, that the firſt ſtep to be taken is a proper compreſſion of the veins, ſo as to produce an accumulation of their contents. The ligature for this purpoſe being applied with a ſufficient degree of tightneſs a little above the ankle-joint, all the branches of the vena ſaphena, both in the inſide and outſide of the foot, come at once into view; and as this vein lies every where very ſuperficial, being in general covered with ſkin only, whereever a proper vein appears conſpicuouſly it may with ſafety be opened.

With a view to encourage the diſcharge of blood, it has been a conſtant practice in blood-letting in theſe veins, to dip the feet into warm water immediately on the orifice being made. But this is a very inaccurate method of proceeding, as the quantity of blood taken in this manner can never be aſcertained with preciſion; for the blood being all mixed with the water, the operator can never be in any degree certain as to this point: And beſides, there does not appear to be any neceſſity for this aſſiſtance; for, when the compreſſion of the ſuperior part of the veins is made effectual, and the orifice is of a proper ſize, I never found more difficulty in obtaining a full diſcharge of blood from the veins of theſe parts, than from any other veins of the body.

On removing the ligature, the diſcharge is generally ſtopped at once; ſo that a piece of adheſive plaſter applied over the orifice, anſwers all the purpoſe of a bandage.

Theſe are the ſeveral parts from whence blood is uſually taken by venæſection; but on ſome occaſions, where the contiguous parts have been particularly affected, it has been thought adviſable to open the veins of other parts, viz. thoſe of the tongue, of the penis, the external hæmorrhoidal veins, &c. When it is found neceſſary to diſcharge blood in this manner from the penis, the veins can be eaſily brought into view by producing an accumulation of their contents in the ſame manner as in other parts of the body, through the intervention of a ligature: But, in the tongue, in the hæmorrhoidal veins about the anus, and other parts where compreſſion cannot be applied, all that the ſurgeon can do, is, to make an orifice of a proper ſize in that part of the vein which ſhows itſelf moſt evidently; and if a ſufficient diſcharge of blood is not thus produced, as there is no other method of effecting it, immerſing the parts in warm water may in ſuch circumſtances be a very neceſſary meaſure.

Having thus conſidered the various modes of diſcharging blood by venæſection, we now proceed to arteriotomy.

SECTION VIII.

Of Arteriotomy.

WHATEVER particular advantages may in theory have been expected from arteriotomy, and however ſome of its ſupporters may in their cloſets have recommended it, not only as being in many inſtances preferable to venæſection, but as an operation perfectly ſafe even in veſſels of conſiderable ſize; yet the moſt ſtrenuous friends to the practice, have ſhrunk from any real attempt of this kind on the larger arteries. Inſtances have no doubt occurred of large arteries having been opened without any danger enſuing; but theſe are ſo exceedingly rare, that no practitioner of experience will from that conſideration be induced cooly to proceed to open any artery of importance. The ſmaller branches of arteries may indeed be opened with great ſafety when they are not deeply covered, and eſpecially when they lie contiguous to bones, as in ſuch ſituations, ſo ſoon as the quantity of blood intended to be taken is diſcharged, all farther loſs of blood may be very eaſily prevented by compreſſion; but, in any of the larger arteries, the attempt muſt be always attended with ſo much hazard, and the advantages to be expected from it in preference to venæſection are apparently ſo trifling, as muſt in all probability prevent it from ever being carried into execution.

There are very few arteries, therefore, which with any propriety can be opened; the different branches of the temporal are the only arteries indeed from whence blood in ordinary practice is ever taken: but, if a fanciful practitioner ſhould at any time in-

incline to take blood in this manner from a different part, it may be done with great ſafety from one of the arteries running on each ſide of the fingers. About the middle of the laſt phalanx, this artery is ſufficiently large for diſcharging a conſiderable quantity of blood; in moſt caſes it lies very ſuperficial, and in this ſituation there can ſeldom much difficulty occur in putting a ſtop to the evacuation. In performing this operation on any of the temporal branches, if the artery lies ſuperficial, it may be done with one puſh of the lancet, in the ſame manner as was directed for venæſection; but, when the artery lies deeply covered with cellular ſubſtance, it is always neceſſary to lay it fairly open to view, before making the orifice with the lancet: For in all the ſmaller arteries, when they are cut entirely acroſs, there is little chance of being able to procure any conſiderable quantity of blood from them; as, when divided in this manner, they are ſure to retract conſiderably within the ſurrounding parts, which commonly puts a ſtop to all farther evacuation.

Some degree of nicety is alſo neceſſary in making the opening into the artery, of a proper oblique direction, neither quite acroſs, nor directly longitudinal; for a longitudinal opening never bleeds ſo freely, either in an artery or in a vein, as when its direction is ſomewhat oblique.

If the opening has been properly made, and if the artery is of any tolerable ſize, it will at once diſcharge very freely without any compreſſion; but when the evacuation does not go on ſo well as could be wiſhed, the diſcharge may be always aſſiſted by compreſſing the artery immediately above the orifice, between it and the correſponding veins. The quantity of blood being thus diſcharged, it will commonly happen, that a very ſlight compreſſion on theſe ſmaller arteries will ſuffice for putting a ſtop to the evacuation: And whatever preſſure is found neceſſary, may be here applied in the ſame manner as was directed in venæſection; firſt, by clearing the orifice entirely of blood; and, having covered it properly with a piece of adheſive plaſter, if that ſhould not be found to anſwer, a compreſs of linen ſhould be applied over it, the whole being then to be ſecured with a roller.

It happens, however, in ſome inſtances, that this does not ſucceed, the orifice continuing to burſt out from time to time, ſo as to be productive of much diſtreſs and inconvenience.

In this ſituation there are three different methods by which we may with tolerable certainty put a ſtop to the farther diſcharge of blood. 1*ſt*, If the artery is ſmall, as all the branches of the temporal arteries commonly are, the cutting it entirely acroſs, exactly at the orifice made with the lancet, by allowing it to retract within the ſurrounding parts, generally puts an immediate ſtop to the diſcharge. 2*d*, When that is not conſented to, we have it always in our power to ſecure the bleeding veſſel with a ligature, as we would do an artery accidentally divided in any part of the body. And, laſtly, if neither of theſe methods is agreed to by the patient, we can by means of a conſtant regular preſſure, obliterate the cavity of the artery at the place where the operation has been performed, by producing an accretion of its ſides. Different bandages have been contrived for compreſſing the temporal artery, but none of them anſwer the purpoſe ſo eaſily and ſo effectually as the one repreſented in Plate VII. fig. 3.

As ſome time, however, is required to obliterate the cavity of the artery, this method is accordingly more tedious; but to timid patients it generally proves more acceptable than either of the other two.

Having thus finiſhed the conſideration of the various methods employed for evacuating blood from the larger arteries and veins, we now proceed to the conſideration of topical blood-letting.

SECTION IX.

Of Topical Blood-letting.

WHEN, either from the ſeverity of a local fixed pain, or from any other cauſe, it is wiſhed to evacuate blood directly from the ſmall veſſels of the part affected inſtead of opening any of the larger arteries or veins, the following are the different modes propoſed for effecting it, viz. By means of leeches; by ſlight ſcarifications with the ſhoulder or edge of a lancet; and laſtly, by means of an inſtrument termed a Scarificator, in which any number of lancets, from one to twenty or upwards, may be placed, and are fixed in ſuch a manner, that, when the inſtrument is applied to the part affected, the whole number of lancets contained in it, are, by means of a ſtrong ſpring, puſhed ſuddenly into it, to the depth at which the inſtrument has been previouſly regulated. This being done, as it is the ſmaller blood-veſſels only that by this operation are ever intended to be cut, and as theſe do not commonly diſcharge freely, ſome means or other become neceſſary for promoting the evacuation.

Various methods have been propoſed for this purpoſe. Glaſſes fitted to the form of the affected parts, with a ſmall hole in the bottom of each, were long ago contrived; and theſe being placed upon the ſcarified parts, a degree of ſuction was produced by a perſon's mouth ſufficient for nearly exhauſting the air contained in the glaſs: And this accordingly was a ſure enough method of increaſing the evacuation of blood to a certain extent*. But, as this was attended with a good deal of trouble, and beſides did not on every occaſion prove altogether effectual, an exhauſting ſyringe was at laſt adapted to the glaſs, which did indeed anſwer as a very certain method of extracting the air contained in it: But the application of this inſtrument for any length of time is very troubleſome;

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* Celſus, lib. 2. cap. 11.

and it is difficult to preſerve the ſyringe always air-tight.

The application of heat to the cupping-glaſſes, as they are termed, has been found to rarify the air contained in them to a degree ſufficient for producing a very conſiderable ſuction. And as the inſtrument in this ſimple form anſwers the purpoſe in view, with very little trouble to the operator, and as it is at all times eaſily obtained, the uſe of the ſyringe has therefore been laid aſide. The glaſſes for this purpoſe, it is evident, muſt be entire; for if there is the leaſt communication allowed between their cavities and the ſurrounding atmoſphere, no effect whatever will be produced by them.

There are different methods adopted for thus applying heat to the cavity of the glaſs. By ſupporting the mouth of it for a few ſeconds above the flame of a taper, the air may be ſufficiently rarified; but if the flame is not kept exactly in the middle, but is allowed to touch either the ſides or bottom of the glaſs, it is very apt to make it crack and fly in pieces. A more certain, as well as an eaſier method of applying the heat, is to dip a piece of ſoft bibulous paper in ſpirit of wine, and having ſet it on fire, to put it into the bottom of the glaſs, and, on its being nearly extinguiſhed, to apply the mouth of the inſtrument directly upon the ſcarified part. This degree of heat, which may be always regulated by the ſize of the piece of paper, and which it is evident ought to be always in proportion to the ſize of the glaſs, if long enough applied proves always ſufficient for rarifying the air very effectually, and at the ſame time, if done with any manner of caution, never injures the glaſs in the leaſt.

The glaſs having been thus applied, if the ſcarifications have been properly made, they inſtantly begin to diſcharge freely; and ſo ſoon as the inſtrument is nearly full of blood, it ſhould be taken away, which may be always eaſily done by raiſing one ſide of it, ſo as to give acceſs to the external air. When more blood is wiſhed to be taken, the parts ſhould be bathed with warm water; and, being made perfectly dry, another glaſs exactly of the ſize of the former ſhould be inſtantly applied in the very ſame manner; and thus, if the ſcarificator has been made to puſh to a ſufficient depth, ſo as to have cut all the cutaneous veſſels of the part, almoſt any neceſſary quantity of blood may be obtained. It ſometimes happens, however, that the full quantity intended to be diſcharged, cannot be got at one place: In ſuch a caſe, the ſcarificator muſt be again applied on a part as contiguous to the other as poſſible; and this being done, the application of the glaſſes muſt alſo be renewed as before.

When it is wiſhed to diſcharge the quantity of blood as quickly as poſſible, two or more glaſſes may be applied at once on contiguous parts previouſly ſcarified; and on ſome occaſions, the quantity of blood is more quickly obtained by the cupping-glaſſes being applied for a few ſeconds upon the parts to be afterwards ſcarified. The ſuction produced by the glaſſes may poſſibly have ſome influence in bringing the more deep-ſeated veſſels into nearer contact with the ſkin, ſo that more of them will be cut by the ſcarificator.

A ſufficient quantity of blood being procured, the wounds made by the different lancets ſhould be all perfectly cleared of blood; and a bit of ſoft linen or charpie dipped in a little milk or cream applied over the whole, is the only dreſſing that is neceſſary: When dry linen is applied, it not only creates more uneaſineſs to the patient, but renders the wounds more apt to feſter than when it has been previouſly wetted in the manner directed.

Although this operation is by no means difficult in the execution, yet a good deal of practice is neceſſary to perform it in a neat and ſucceſsful manner; but with a little attention, any operator may ſoon become ſo expert, as to be able to take any quantity of blood that it can ever be neceſſary to evacuate.

In ſome caſes of local pains, and in others where ſuppuration of the part has been wiſhed for, an operation termed *dry cupping* has been propoſed, and in ſome inſtances its advantages are ſaid to have proved conſiderable. This conſiſts in the application of the cupping-glaſſes directly to the parts affected, without the uſe of the ſcarificator. By this means a tumor is produced upon the part; and where any advantage is to be expected from a determination of blood to a particular ſpot, it may probably be more eaſily accompliſhed by this means than by any other.

In Plate VI. are repreſented a ſcarificator, and different ſizes and figures of cupping-glaſſes, with which every operator ought to be amply ſupplied, ſo as to be able to adapt a glaſs to every part from whence it may be proper to diſcharge blood in this manner. When the part from which it is intended to produce a local evacuation of this kind is ſo ſituated that a ſcarificator and cupping-glaſſes can be applied, this method is greatly preferable to every other; but it now and then happens, that parts are ſo ſituated as not to admit of

Plate V.

Fig. 1.

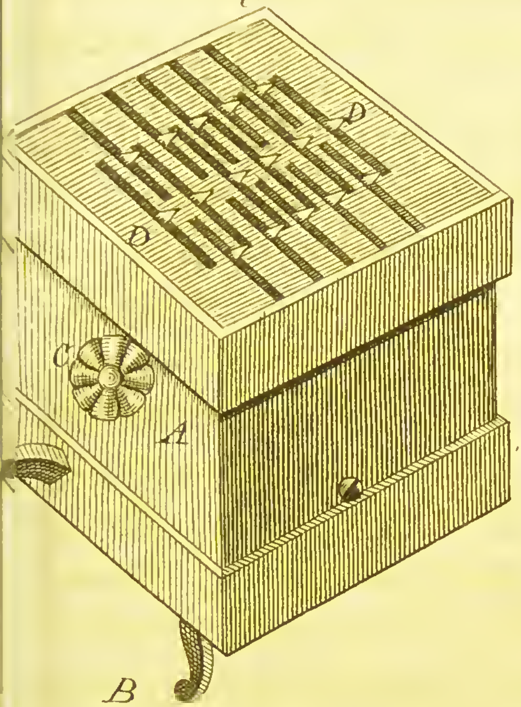


Fig. 2.

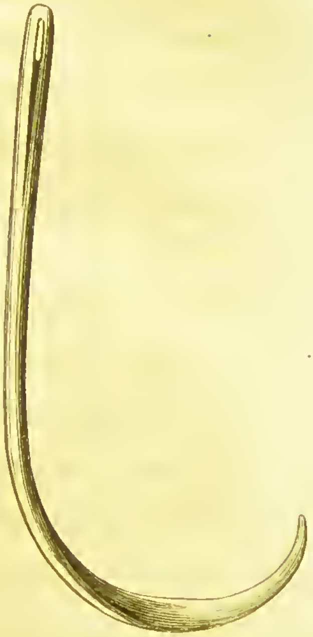


Fig. 3.

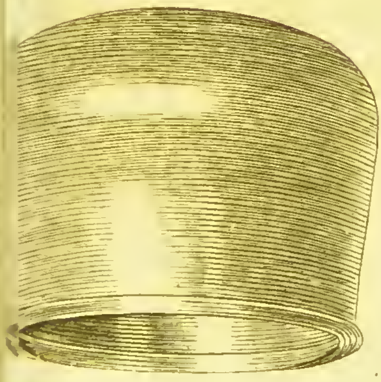
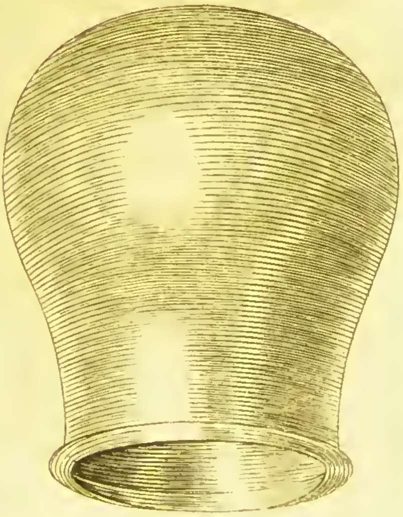


Fig. 4.



A. Bell Sculp.t

of their application: Thus, in inflammatory affections of the eye, of the noſe, and of other parts of the face, the ſcarificator cannot be properly applied directly to the parts affected. In ſuch inſtances, leeches are commonly had recourſe to, as they can be placed upon almoſt any ſpot from whence we would wiſh to diſcharge blood.

In the application of theſe animals, the moſt effectual method of making them fix upon a particular ſpot, is to confine them to the part by means of a ſmall wine-glaſs. Allowing them to creep upon a dry cloth, or upon a dry board, for a few minutes before application, makes them fix more readily; and moiſtening the parts on which they are intended to fix, either with milk, cream, or blood, tends alſo to cauſe them adhere much more ſpeedily than they otherwiſe would do. So ſoon as the leeches have ſeparated, the ordinary method of promoting the diſcharge of blood, is to cover the parts with linen cloths wet in warm water: In ſome ſituations, this may probably be as effectual a method as any other; but wherever the cupping-glaſſes can be applied over the wounds, they anſwer the purpoſe much more effectually: Wherever the figure of the part, therefore, will admit of their application, they ought undoubtedly to be employed.

Among other methods of effecting what we term Local Blood-letting, ſcarifications with the edge or ſhoulders of a lancet was mentioned as one: There are not many inſtances in which this proves very neceſſary; but now and then caſes do occur in which blood may be taken in this manner, when it cannot with propriety be diſcharged by any other means. This is particularly the caſe in ſome inflammatory affections of the eye, where the ball of the eye is chiefly affected, and where general blood-letting and evacuations from the neighbouring parts do not prove effectual. In ſuch affections it frequently happens, that ſcarifying the veſſels of the tunica conjunctiva of the eye, ſo as to evacuate perhaps only a very few drops of blood, is productive of much advantage. The mere diviſion of the veſſels in ſuch caſes, has indeed been ſuppoſed to be of uſe; but I have conſtantly obſerved, that the advantage produced by this operation, has been in general nearly in proportion to the quantity of blood diſcharged by it.

Different methods have been propoſed for performing it, but the eaſieſt and moſt effectual, is by means of the edge or ſhoulder of a lancet. For this purpoſe, the upper eye-lid being ſupported by the hand of an aſſiſtant, and the under palpebra being ſecured by the fingers of the operator's left-hand, with the lancet in his right-hand, a number of ſlight ſcarifications ſhould be made through the different veſſels that ſeem to be moſt turgid. In order to ſecure the eye properly, it has been adviſed to have it previouſly fixed by a ſpeculum before attempting to ſcarify the veſſels. There is not, however, any occaſion for this precaution, as the eye may be always made ſufficiently ſteady for this operation, by gentle preſſure with the fingers in the manner directed; and beſides,

ſides, in this inflamed ſtate of the eye, the preſſure produced by a ſpeculum is very apt to do miſchief.

To ſuch as have not ſeen this operation put in practice, it may perhaps appear to be too hazardous to be attempted by thoſe who are not much accuſtomed to it; but a very moderate degree of ſteadineſs renders it very eaſily and ſafely practicable. All the veſſels intended to be cut, being freely divided, bathing the eye in warm water is the moſt effectual method of encouraging the diſcharge.

In the ſame manner, ſcarifications of this kind may at times be uſefully employed in removing inflammatory affections of the eye-lids; and the ſame remedy may now and then, perhaps, be uſed with advantage in ſimilar affections of other parts.

Among other methods that have been propoſed for ſcarifying the blood-veſſels of the eye, the beards of rough barley were at one period much extolled, and are ſtill employed by ſome individuals.

By drawing them over the ſurface of the eye, in a direction contrary to the ſharp ſpiculæ with which they are furniſhed, a conſiderable diſcharge of blood is thereby produced. But, the pain attending this operation is exquiſite; and as it does not poſſeſs any ſuperior advantage to the method with the lancet, it is now falling into general diſuſe.

We have thus finiſhed the conſideration of the various means employed in ſurgery for evacuating blood from the ſyſtem; and as the diſorder termed Aneuriſm is frequently produced by an unguarded manner of performing one of the operations we have juſt been deſcribing, the farther conſideration of this ſubject cannot, we think, be any where more properly introduced than in this place, where one of the principal cauſes tending to produce it has been ſo lately treated of.

EXPLANATION *of* PLATE III.

Fig. 1. A ſcrew tourniquet deſcribed, p. 29. Every part of the inſtrument is here repreſented of the full ſize: It may

be made either of braſs or ſteel; and the ſtrap connected with it ought to be of very firm materials, at leaſt an inch broad, and of a length ſufficient to paſs fully round the largeſt diameter of any of the extremities.

Fig. 2. A ſpring phlegm deſcribed, p. 72, 75. This inſtrument is alſo repreſented of the full ſize.

EPLANATION *of* PLATE IV.

Fig. 1. and 2. Two ſcalpels of the beſt form, either for the anatomiſt or ſurgeon. Fig. 1. is of a ſize large enough for any operation; and fig. 2. is of a very uſeful ſize for operations about the eyes, mouth, and other parts where a larger inſtrument proves inconvenient.

Fig. 3. and 4. The beſt form of lancet for the operation of blood-letting, deſcribed p. 76. Fig. 3. is of a full ſize for any purpoſe of this kind; and fig. 4. is for the ſmall veins of infants.

Fig. 5. repreſents the broad-ſhouldered lancet in ordinary uſe; but which, from its figure, is evidently ill-ſuited for the nice operation of venæſection.

EXPLANATION *of* PLATE V.

Fig. 1. A ſcarificator with ſixteen lancets. *A*, a cubical braſs box, in which the blades of the lancets firmly fixed on an axis are included. *B*, a lever for bending a ſpring with which the axis and its lancets are connected. *C*, a button or head of a ſcrew-nail connected with a catch for ſecuring the ſpring in a bent ſtate: On the ſpring being bent by means of the lever *B*, and the flat part of the inſtrument *DD* being placed upon the part to be ſcarified, the button *C* is then to be preſſed upon till the ſpring is unbent, which forces the lancets into the parts they are placed upon, to the depth at which they have been previouſly ſet; and the flat covering of the box *DD* being moveable, ſerves to regulate the length of the lancets which paſs thro' it.

Fig. 2. A cupping-glaſs with a mouth of an oval form; and fig. 3. repreſents one of the ordinary round kind.

Fig. 4. A ſtrong curved needle, with a round though ſomewhat ſharp point. This inſtrument anſwers the purpoſe better than any yet contrived, for introducing ligatures below the artery, in the operation for the aneuriſm; and below the ſpermatic cord, in the operation of caſtration.

All the inſtruments of this Plate are repreſented of a proper ſize for uſe.

CHAP. IV.

Of ANEURISMS.

SECTION I.

General Remarks on Aneuriſms.

THE term Aneuriſm, was originally meant to ſignify a tumor formed by the dilatation of the coats of an artery; but by modern practitioners, it is made to apply,

ply, not only to tumors of this kind, but to ſuch as are formed by blood effuſed from arteries into the contiguous parts; a circumſtance which may happen either from an artery being punctured with a ſharp inſtrument, or from a rupture of its coats produced by any other cauſe.

The firſt ſpecies of the diſorder, viz. that which depends on an extenſion or dilatation of the coats of an artery, has been denominated the True Aneuriſm; and the latter, or that which proceeds from an effuſion of arterial blood into the ſurrounding parts, has been commonly termed the Falſe Aneuriſm.

As the introduction of new appellations frequently tends to produce confuſion, neceſſity alone ought to render ſuch an attempt admiſſible; and accordingly it will rarely happen, in the courſe of the preſent work, that any innovation of this kind is made. In the preſent inſtance, however, as the nature and treatment of the diſorder may be rendered more clear and diſtinct by a change of terms applied to the different ſpecies of aneuriſm, an attempt of this kind, may for ſuch a reaſon, it is hoped, be made without any impropriety.

In that ſpecies of the diſorder depending upon the dilatation of an artery, as the tumor is always circumſcribed, and contained within coats peculiar to itſelf, it may therefore properly enough be termed the Encyſted Aneuriſm; and the other, from the ſwelling ſpreading extenſively over the neighbouring parts, may with equal propriety be termed the Diffuſed Aneuriſm.

As theſe two ſpecies of the diſorder are very different from one another, not only in their cauſes, appearance, and effects, but even in the treatment neceſſary for their removal; it will be proper, therefore, to enter into a ſeparate conſideration of each of them.

In the true or encyſted aneuriſm, when externally ſituated, the tumor when firſt obſerved is commonly very ſmall and circumſcribed; the ſkin retains its natural appearance; when preſſed by the fingers, a pulſation correſponding with that of the artery below is evidently diſtinguiſhed; and with very little force the contents of the ſwelling, which are yet ſoft and fluctuating, may be eaſily made to diſappear entirely.

If means properly calculated for the removal of the diſeaſe are not now put in practice, or if upon trial they ſhould be found to fail, the ſwelling begins to increaſe, becomes more prominent, and continues in a gradual manner to acquire a larger ſize. For a conſiderable time the ſkin and teguments retain their natural appearance; the patient does not complain of pain, not even on preſſure; the tumor continues of an equal ſoftneſs; and its contents are ſtill compreſſible, yielding conſiderably, and in general diſappearing entirely on the application of preſſure. At laſt, however, when the ſwelling becomes very large, the ſkin loſes its ordinary colour, becomes pale, and, in the more advanced ſtages of the diſeaſe, even œdematous;

tous: The pulſation ſtill continues; but the tumor although ſoft in ſome parts, yet in others is firm, and cannot now be made to yield much upon preſſure, owing to part of the contained blood having in this ſtage of the diſeaſe become hard by coagulation.

The ſwelling continuing to increaſe, in a gradual manner it becomes more painful, and produces much diſtreſs; the ſkin turns livid, apparently verging to a gangrenous ſtate: at laſt, an oozing of bloody ſerum occurs from the teguments; and if a real mortification does not take place, the ſkin cracks in different parts, and the force of the artery not now meeting with ſo much reſiſtance as before, in a very ſhort ſpace of time, if the veſſel is large, a period is put to the patient's exiſtence, by the blood burſting out with ſuch violence as to produce almoſt inſtantaneous death; at leaſt in the larger arteries of the trunk of the body, this is the ordinary event of all ſuch affections. In the extremities, however, the arteries are not ſo large as by their rupture to be capable of producing ſuch immediate fatal effects; and beſides, we can here, in general, by means of the tourniquet, be always certain of preventing this ſudden termination of the diſeaſe.

In aneuriſmal affections of the larger arteries, the effects produced upon the neighbouring parts by the conſtant pulſation and gradual augmentation of the tumor, are often ſurpriſing. The ſofter parts we might, *à priori*, expect to yield to a very conſiderable extent; but the hardeſt parts of the body, probably from the very circumſtance of their *not being capable of yielding*, evidently ſuffer more from the effects of this kind of preſſure, than either membranes, muſcles, or ligaments. Even the bones frequently undergo a very great degree of derangement, by the pulſation and diſtenſion of contiguous aneuriſms: Sometimes they are ſeparated entirely from one another at the different joints: On ſome occaſions they are elevated much out of their natural ſituations; and in many inſtances they have been found entirely diſſolved.

Occurrences of this kind are not common in any of the extremities, as it is the ſtrong pulſation of the aorta only, or of ſome of the larger arteries at no great diſtance from the heart, that we can ever ſuppoſe ſhould be followed by ſuch conſequences. Now and then, however, ſimilar effects of an aneuriſm have been obſerved in the thigh, and ſuperior parts of the arm; even the bones of theſe parts having been found much affected by aneuriſmal ſwellings of the neighbouring arteries.

The appearance and termination of encyſted aneuriſms, are in general very nearly as is here repreſented: One exception, however, occurs in a particular ſpecies of the diſorder, which will afterwards be more accurately deſcribed.

Various cauſes may be ſuppoſed neceſſary to the production of encyſted aneuriſms. 1. We know from daily experience, that partial debility frequently occurs in different parts of the ſyſtem: Thus, there is nothing more common than œdematous ſwellings of the extremities, even in conſtitutions otherwiſe healthy; and ſwellings of this nature, we juſtly ſuppoſe to depend moſt frequently on a local weakneſs of the parts in which they occur. Now, why may not a debility of a ſimilar kind fall upon part of the arterial ſyſtem? and, if it ſhould ever do ſo, we can eaſily ſee how in almoſt every inſtance it muſt neceſſarily terminate in aneuriſmal ſwellings: For the force of the heart continuing the ſame, if any particular part of an artery has loſt its tone, as it is thereby rendered incapable of reſiſting the pulſations of the heart, a yielding, or dilatation of its coats, muſt at theſe weakened parts naturally enſue; and ſo ſoon as a morbid diſtenſion of its diameter is thus fairly commenced, as its power of reſiſtance will of courſe proportionally diminiſh, while at the ſame time the *vis à tergo* ſtill continues equally powerful, the farther increaſe of the ſwelling is a conſequence that muſt neceſſarily enſue.

This cauſe of the diſeaſe may be conſidered as the moſt frequent origin of aneuriſms that do not evidently depend upon external injuries: All ſuch ſwellings as occur in the courſe of the aorta, ſeem clearly to depend on this cauſe; as is in general the caſe, indeed, with all ſuch as happen internally, in whatever part of the body they may be ſituated.

2. The external coats of an artery being deſtroyed by a wound with any kind of inſtrument, a partial weakneſs of the part will be thus produced; and this muſt render it liable to be acted upon to advantage, by the heart and other parts of the arterial ſyſtem, in the ſame manner as if it had been previouſly debilitated by diſeaſe.

In dilatations of an artery produced by this cauſe, the diſorder proceeds in the manner we have already deſcribed. The blood from being ſtill confined within the coats of the artery, continues to form a circumſcribed tumor. In the beginning of the diſeaſe, the ſwelling is eaſily made to diſappear upon preſſure; but on advanceing farther, part of its contents become ſo firm by coagulation, as to render it impoſſible to diſcuſs it by any degree of preſſure that can with propriety be applied. This ſpecies of the diſorder may now and then occur from other cauſes, but it is moſt frequently produced by blood-letting in the arm; by the lancet, after having paſſed through the vein going ſo deep as to divide the external coats of the artery.

3. A ſimilar effect has been ſometimes produced, by the matter contained in neighbouring ſores and abſceſſes, proving ſo corroſive as to deſtroy the external coverings of the contiguous arteries: When this happens to occur, the ſame train of ſymptoms, it is evident, muſt ſucceed as if the outer coats of the veſſel had been deſtroyed by a lancet or any other ſharp inſtrument.

4. The bones, muſcles, ligaments, &c. with which arteries are ſurrounded, all ſerve as a ſupport to theſe veſſels, ſo that it is not ſurpriſing, that the deſtruction of any of theſe parts ſhould tend to the production of aneuriſms; and accordingly in-

inſtances have occurred, where affections of this kind ſeemed evidently to depend on ſuch a cauſe: Indeed the firmneſs and ſtability of any ſet of parts naturally connected together, depends ſo much upon a ſound ſtate of the whole, that any one of them becoming weak and diſeaſed, generally terminates in the deſtruction of all or part of the remainder. In the thigh of a patient where part of the muſcles and other ſoft parts had been deſtroyed by an extenſive mortification, different aneuriſmal ſwellings occurred in the courſe of the femoral artery which had thus loſt part of its ſupport; and no other cauſe appeared to be concerned in their production.

5. In blood-letting at the uſual place in the arm, it was already remarked, that arteries are ſometimes wounded, by the lancet paſſing quite through the vein into the artery below; and when the artery happens to be directly in contact with the vein, the blood diſcharged from the orifice made in the artery, by paſſing directly into the vein, ſerves to perpetuate a communica-

tion between the trunk of the one, and a principal branch of the other.

In this manner, a direct paſſage being produced between the artery and vein, and the coats of the latter not being ſufficiently firm for reſiſting the impulſe of the former, a preternatural dilatation of the vein is a conſequence that muſt neceſſarily follow: A tumor accordingly is very ſoon produced, which is at firſt ſmall and circumſcribed, but by degrees it extends conſiderably both above and below the orifice; not only along the courſe of the vein originally wounded, but, onſome occaſions, all the veins lying contiguous come to be equally diſtended.

This ſpecies of the diſeaſe was firſt accurately deſcribed by that celebrated anatomiſt Doctor William Hunter; and may with great propriety be termed the *varicoſe aneuriſm.* Since that period it has been frequently obſerved by different practitioners; ſo that its nature is now very generally underſtood.

Although the coats of the artery are

here ſuppoſed to be all cut fairly open, ſo as to produce an immediate diſcharge of blood; yet by the blood being contained within the cavity of the veins, this ſpecies of the diſeaſe may with equal propriety be conſidered as encyſted, as any of the preceding; and as the treatment of it coincides much with that of other encyſted aneuriſms, the farther conſideration of the ſubject, could not, it was imagined, be any where more properly introduced.

In this ſpecies of aneuriſm, the ſwelling is confined entirely to the veins. Soon after the injury producing it has been committed, the vein communicating immediately with the artery begins to ſwell: In a gradual manner, this enlargement becomes more remarkable; and when any conſiderable anaſtomoſis occurs near to the part affected, between it and the contiguous veins, theſe alſo become much enlarged. By preſſing upon this ſwelling of the veins, it may be made to diſappear entirely, by the blood contained in them being in part puſhed forward in its courſe towards the heart, while part of it may poſſibly be forced into the artery itſelf; and, when the tumor happens to be of a conſiderable ſize, the blood, when it is thus by compreſſion forced out of it, is heard to make a very ſingular hiſſing kind of noiſe. This, when it occurs, is a very characteriſtic ſymptom of the diſeaſe; but as it is not met with in every caſe, it becomes neceſſary to point out particularly, ſuch circumſtances as more certainly ſerve to diſtinguiſh this ſpecies of aneuriſm.

In the varicoſe aneuriſm there is a very ſingular tremulous motion diſcovered in the dilated vein, attended with a perpetual hiſſing noiſe as if air was paſſing into it through a ſmall aperture. If a firm ligature be applied upon the under part of the limb, immediately below the ſwelling, and be tied ſo tight, as even to ſtop the pulſe in the under part of the member, the ſwelling in the veins on being removed by preſſure, returns inſtantaneouſly on the preſſure being taken off, and does not appear to be in any degree affected by the ligature below; which it undoubtedly would be, was it not for the direct communication between the trunk of the artery and correſponding vein. The ſwelling being removed by preſſing the blood forward to the heart, and a ſlight preſſure being made with the point of the finger on the orifice in the artery, the veins remain perfectly flaccid, without any ſwelling whatever being produced, till the preſſure is removed from the orifice, when they fill again immediately; and this even happens, altho' the preſſure on the artery is not ſo firm as to ſtop the circulation in the under part of the limb.

In the ſame manner, too, if the trunk of the artery be compreſſed above the orifice, ſo as to ſtop the circulation effectually, that tremulous motion and hiſſing noiſe in the ſwelling of the veins ceaſes inſtantly; and, if the veins are now emptied by preſſure, they are ſure to remain ſo till the compreſſion upon the artery is removed. On ſome occaſions, too, it happens, that if two ligatures be applied, one an inch or two above, and the other as much below the ſwelling, and are made ſo tight, as to ſtop entirely the circulation of the blood in the tumor lying between them; if the ſwelling is now compreſſed, all the blood contained in it is made to paſs into the opening in the artery, from whence it inſtantly returns again on the preſſure being removed from the tumor. This, however, does not always happen; and its not doing ſo, is no proof whatever of that ſpecies of aneuriſm now under conſideration not actually exiſting; for if all or ſeveral of the leading circumſtances of the diſeaſe which we have juſt enumerated ever take place, the nature of the diſorder is thereby rendered clear and evident.

In addition to the other characteriſtic ſymptoms of the varicoſe aneuriſm, it may be remarked, that when it has continued for any length of time, ſo as to have produced a conſiderable dilatation of the veins, the trunk of the artery above the orifice generally becomes preternaturally large, while the branches below become proportionally ſmall; and of conſequence, the pulſe in the under part of the member, is always more feeble than in the ſound limb of the oppoſite ſide.

The reaſon of this laſt circumſtance is obviouſly this; that the blood, by finding a direct paſſage between the trunk of the artery and the principal branch of the correſponding vein, paſſes more readily in that way, than by the common courſe of circulation along the under part of the member; ſo that the quntity of blood ſent to the inferior extremities of the artery being thus much diminiſhed, the pulſation produced by it muſt of courſe become proportionally feeble: But why the ſuperior part of the artery ſhould be enlarged, by the blood paſſing thus ſo directly and eaſily from it into the vein, is a circumſtance not ſo eaſily accounted for. The reſiſtance to the blood paſſing through the artery, is by this direct communication between it and the vein very much diminiſhed; and this has been ſuggeſted, as the cauſe of the phenomenon. But, this circumſtance, of the reſiſtance to the tranſit of the blood being thus diminiſhed, we might more readily expect to have a very contrary effect. In other parts of the circulating ſyſtem, we always find, that reſiſtance to the paſſage of the fluids terminates in a dilatation of the containing veſſels; and that ſwellings thus produced, can be removed by no other means than the removal of that reſiſtance which firſt gave riſe to them. Nothing that can be ſaid upon this ſubject, however, will afford much ſatisfaction, as it is merely a ſpeculative point; and as it can have no great influence on the practical treatment of the diſorder, we ſhall not here attempt a farther inveſtigation of it.

Having thus enumerated the ordinary appearances of the different ſpecies of encyſted aneuriſm, together with the various cauſes which are found to produce them, we ſhall now proceed to deſcribe the ſymptoms and cauſes of the diffuſed aneuriſm, and ſhall conclude with the treatment of the various ſpecies of the diſeaſe.

The Diffuſed, or what is commonly termed the Falſe Aneuriſm, conſiſts in a wound or rupture of an artery, producing, by the blood thrown out from it, a ſwelling, more or leſs diffuſed, of the contiguous parts.

Great bodily exertion, has frequently proved an evident means of inducing a rupture of very conſiderable arteries ſeated internally: This we know to be particularly frequent in thoſe of the lungs, probably from their being in that organ ſurrounded with ſuch ſoft contiguous parts as do not afford them much ſupport; and probably from the contrary reaſon, that here the arteries are more firmly ſupported ſuch accidents ſeldom or never occur in the external parts, where alone they could ever become the object of Surgery. We ſhall therefore confine our deſcription of this diſorder, entirely to that kind of it which we know to be moſt frequently produced by a wound made directly into an artery, and which it is commonly in the power of art to relieve.

When treating of the conſequences of venæſection in the arm, wounding the contiguous artery was particularly mentioned as one: In a few inſtances, by the treatment then pointed out, any bad effects which might otherwiſe occur from this circumſtance, will be entirely prevented, by the wound in the artery healing without any of the uſual conſequences being produced by it. Such happy terminations, however, of this accident, are exceedingly rare, and can never with any degree of certainty be depended on.

When a punctured artery reſiſts the means employed for preventing the ordinary effects known to reſult from it, it will then for certain terminate in a ſwelling of the aneuriſmal kind, and the following is the uſual progreſs of the diſorder.

A ſmall tumor, of the ſize of a horſe bean or thereby, generally riſes juſt at the orifice in the artery, ſoon after the diſcharge of blood has been ſtopt by compreſſion: At firſt the tumor is ſoft, has a ſtrong degree of pulſation, and yields a little upon preſſure. It is never, however, ſo compreſſible as the ſwelling of an encyſted aneuriſm,

aneuriſm: For in the latter, except in the more advanced ſtages of the diſeaſe, the blood remains perfectly fluid, and communicates with the general maſs of circulating fluids; whereas, in the diffuſed aneuriſm, the blood forming the tumor is at once extravaſated; and as in that ſtate it ſoon begins to coagulate, it is not long in acquiring a very firm degree of conſiſtence.

In this ſtate of the diſorder, if the ſwelling is not improperly treated by the application of much preſſure, it generally remains nearly of the ſame ſize for ſeveral weeks, when it begins gradually to increaſe; and if ſeated in the uſual part of blood-letting in the arm, it proceeds rather farther up than the orifice, and extends rather more inwardly than towards the outer part of the arm, probably from the expanſion of the biceps muſcle not being there ſo firm and compact as in the external and under part of the arm. This enlargement of the tumor, too, proceeds with much more quickneſs in ſome inſtances than in others, and on ſome occaſions the ſwelling is much more diffuſed and extended than in others.

Both theſe circumſtances, it is probable, depend upon the ſame cauſe. If the blood poured out by an artery, is thrown into a very lax cellular ſubſtance, we can eaſily ſuppoſe, that its increaſe will not only be more rapid, but that the diffuſion of the tumor muſt for the ſame reaſon be much more conſiderable, than when the artery, inſtead of being ſurrounded with much looſe cellular ſubſtance at the place where the puncture is made, is immediately enveloped by firm membranous or ligamentous parts, which do not ſo readily yield to the impulſe of the blood. There is, from this circumſtance alone indeed, ſuch a remarkable difference in the progreſs of the diſorder, that in ſome inſtances ſwellings of this kind have been many months, nay even years, in arriving at any conſiderable ſize; and on the contrary, ſome inſtances have occurred of the blood from the orifice in the artery, being diffuſed over the whole arm from the elbow up to the ſhoulder, in the ſpace of a few hours from the operation.

A particular laxity of cellular ſubſtance, has undoubtedly, in all ſuch inſtances, a great influence in promoting this rapid diffuſion of the extravaſated blood; but the ordinary practice in every caſe of a wounded artery, of applying very tight compreſſion, I am convinced, has alſo a very great influence in producing the ſame effect. In addition to what was ſaid upon this point in the chapter on Blood-letting, I ſhall here juſt obſerve, that if it was poſſible to produce a moderate degree of preſſure upon the orifice in the artery alone, that ſome advantage might now and then perhaps be derived from it; but in order to apply a degree of compreſſion ſufficient for producing any influence upon the artery, the principal veins in the limb muſt by the ſame means be all ſo much acted upon, as to occaſion much obſtruction to the return of blood from the correſponding artery. And whatever tends in any degree to obſtruct the refluent blood, as it muſt in an equal proportion diſtend the artery from whence it ought to come, ſo it muſt neceſſarily counteract with great effect the compreſſion produced on the orifice in the artery. Many machines have indeed been contrived for producing a partial compreſſion upon the artery without affecting the reſt of the limb: But however much theſe may have been extolled by their ſeveral inventors, yet none hitherto diſcovered anſwers the purpoſe of compreſſing the artery, without at the ſame time tending greatly to obſtruct the circulation in the veins; inſomuch that a great deal of miſchief has on different occaſions been produced by all of them.

Whoever inclines to have recourſe to the uſe of theſe inſtruments, will find a variety of them delineated in Heiſter's ſyſtem of Surgery, and in Dionis and Platner's works.

Mr Dionis, an eminent French ſurgeon, although in caſes of wounded arteries he recommends the uſual practice of compreſſion, yet relates a caſe which happened to a ſurgeon of his acquaintance, in which the bad effects produced by it were ſo ſtrongly marked, as muſt convince any perſon of the general impropriety of ſuch a remedy.

A ſurgeon having in blood-letting opened an artery, the uſual method of tight compreſſion was immediately employed. By this means the diſcharge of blood externally was very ſoon ſtopped: But ſome blood continuing to eſcape from the orifice in the artery, paſſed up towards the ſuperior part of the arm, which it filled to ſuch a degree, that on the operation for the aneuriſm, which was ſoon found neceſſary, being performed, upwards of four pounds of coagulated blood was diſcharged from it; and for this purpoſe it became neceſſary to lay the parts open along the whole courſe of the arm *.

When, again, compreſſion has not been applied to ſuch tumors, unleſs there is a very unuſual degree of ſoftneſs and laxity in the ſurrounding parts, the ſwelling proceeds to increaſe in a more gradual manner:

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* Vid. Dionis's courſe of Chirurgical Operations.

ner: As it becomes larger, it does not, like the true aneuriſm, become much more prominent, but rather ſpreads and diffuſes itſelf into the ſurrounding parts: By degrees it acquires a very firm conſiſtence; and the pulſation, which was at firſt conſiderable, always diminiſhes in proportion to this difference of conſiſtence, and to the increaſe which the tumor receives in point of ſize; inſomuch, that in large aneuriſmal ſwellings of this kind, it ſometimes happens, that the pulſation of the artery is ſcarcely perceptible.

In the firſt ſtages of the tumor, if the blood thrown out from the artery lies very deep, the ſkin preſerves its natural appearance, and does not change its colour till the diſorder is much advanced. It frequently happens, however, that the blood is at firſt thrown out with ſo much violence, as to get into immediate contact with the ſkin; and when this occurs, the colour of the parts becomes inſtantly livid, as if tending to a ſtate of mortification. A real ſphacelus, indeed, has on ſome occaſions been induced where the extravaſation of blood has been conſiderable, and where the means beſt ſuited for its removal have either failed or have been entirely neglected.

It muſt be conſidered, however, as a piece of unpardonable negligence, in any practitioner, to allow a patient, from this cauſe, to run that degree of riſk which always attends mortification; for the hazard attending the operation of the aneuriſm, is in general trifling when compared with the danger accruing from an extenſive gangrene.

As the tumor in this ſpecies of the diſeaſe proceeds to increaſe, the patient, who during the firſt ſtages of it did not complain of much uneaſineſs, is now much diſtreſſed not only with ſevere pains, but with ſtiffneſs, want of feeling, and immobility of the whole member: And theſe ſymptoms continuing to augment, if the tumor is not previouſly operated upon, the teguments at laſt burſt; and if the artery is of any conſiderable ſize, and if we have not immediate recourſe to effectual means for preventing it, death muſt for certain enſue, in conſequence of the very profuſe hæmorrhagy which muſt thus be produced.

Various cauſes were enumerated, as being frequently under certain circumſtances productive of the encyſted aneuriſm; ſome variety occurs too of cauſes which terminate in the diffuſed ſpecies of aneuriſm.

I. Violent bodily exertions may be conſidered as the moſt frequent cauſe of the rupture of arteries ſituated internally; but as theſe do not properly belong to a work of ſurgery, we ſhall not here enter with any prolixity into their conſideration.

II. The corroſive matter of ſores and abſceſſes, by entirely deſtroying the coats of a contiguous artery, may in this manner be productive of the diffuſed aneuriſm.

III. The ſharp ſpiculæ of a fractured bone being puſhed into a neighbouring artery, have, on different occaſions, produced aneuriſm.

IV. Violent blows have been known to produce aneuriſmal ſwellings of this kind.

This, however, can ſcarcely happen in any other ſituation than on the head, where the arteries lie more expoſed than in other parts to the effects of ſuch injuries, by their being here very thinly covered, and from a blow in this ſituation acting with great advantage, by falling on the artery lying almoſt in cloſe contact with a firm hard body, the cranium.

V. If the arterial covering of an *encyſted* aneuriſm, ſhould ever burſt before the external teguments of the tumor, in that caſe the blood contained in it would diffuſe itſelf into the contiguous parts; and in ſuch an event, the diſeaſe would no doubt become a real *diffuſed* aneuriſm. Such an occurrence, however, we have reaſon to think, very rarely, if ever happens; for, inſtead of the *internal* coverings of ſuch tumors firſt breaking, ſo far at leaſt as I have had opportunities of obſerving, it is the very reverſe. The ſwelling going on to increaſe in a gradual manner, the teguments at laſt become ſo tenſe and overſtretched, that they loſe their tone entirely;

the ſkin becomes ſoft and œdematous; on ſome occaſions, it gets into a gangrenous ſtate; and on others, altho' it retains its natural white colour, yet its uſual powers are as evidently deſtroyed as they ever are in the laſt ſtage of mortification. In this ſtate it generally remains for a longer or ſhorter ſpace of time, according to the ſtrength of the arterial pulſation below. At laſt, however, the ſkin begins to crack, and a thin ſerum oozes out; the edges of this ſmall fiſſure in the teguments gradually ſeparate from one another; and the contents of the tumor having loſt a conſiderable part of their ſupport, the force with which they are impelled, by degrees becomes too powerful for the remaining coverings, which accordingly ſoon burſt, ſo as to diſcharge their contents externally, without producing any effuſion among the neighbouring parts.

I ſhould therefore ſuſpect, that authors in general have all along been under ſome miſtake on this point: The encyſted, or true aneuriſm, as it is termed, has been always ſuppoſed in its laſt ſtages to burſt internally, and ſo to produce the diffuſed or falſe ſpecies of the diſeaſe; from what has been ſaid, however, there is good reaſon to preſume, if ever it does happen, that it is at leaſt a very rare occurrence. The progreſs and termination of the encyſted aneuriſm, in every caſe I have either ſeen, or known well authenticated, has been very nearly as we have juſt deſcribed; not by the arterial ſac firſt burſting, but by a rupture being produced in the external teguments after they have been greatly over-ſtretched; the blood being ſoon thereafter diſcharged outwardly, without producing any effuſion into the ſurrounding parts. As it has been alleged, however, by very reſpectable authors, that the contrary of this does now and then happen, and as there is a poſſibility of its doing ſo, I could not here avoid conſidering it as one of the cauſes of diffuſed aneuriſm.

VI. The moſt frequent cauſe, however, of this ſpecies of aneuriſm, are punctures with ſharp inſtruments, ſuch as ſwords, cutlaſſes, and particularly the lancet, which laſt may be conſidered as having been productive of at leaſt nine-tenths of all the aneuriſmal ſwellings that ever occurred.

Under one or other of theſe heads, almoſt every circumſtance may be comprehended, that can ever tend to the production of ſuch affections.

On many occaſions, it has unfortunately happened, that tumors of the aneuriſmal kind have been miſtaken for abſceſſes and other collections of matter, and their contents of courſe have been laid open by inciſion. The conſequences of ſuch practice, may be more readily conceived than deſcribed. With a view to prevent ſuch dreadful occurrences, it would be a matter of very great importance to practitioners, to have ſuch a ſet of diagnoſtic ſymptoms of aneuriſm pointed out, as would with certainty determine the nature of the complaint. In the commencement of the diſorder, there is in general no great difficulty in this matter, as the pulſation in the tumor is commonly ſo ſtrong, and other concomitant circumſtances tend ſo obviouſly to ſupport the idea of aneuriſm, that, in this period of the complaint, little or no doubt reſpecting it can ever occur; but, in the more advanced ſtages of the diſeaſe, when the ſwelling has become very large, and has loſt its pulſation entirely, nothing but a very minute attention to the previous hiſtory of the caſe ought to have any influence in forming a judgment of its nature.

Thoſe ſwellings, with which aneuriſms are moſt likely to be confounded, are, ſoft encyſted tumors, ſcrophulous ſwellings, and abſceſſes containing either purulent or other matter, ſituated either immediately above, or ſo nearly in contact with an artery, as to receive the influence of its pulſation; and when any ſuch tumor happens to be nearly connected with an artery of conſiderable ſize, the pulſation communicated to it is frequently found to be ſo very ſtrong and diſtinct, as to render it impoſſible from this circumſtance alone, to form any juſt idea as to the nature of its contents.

But there is one ſymptom, which when preſent, and when connected with a ſtrong pulſation in the tumor, may always lead us to determine with a great degree of certainty, that the ſwelling is of the aneuriſmal kind; and it is this; the contents of the tumor being made eaſily to diſappear upon preſſure, at the ſame time that they return inſtantaneouſly on the compreſſion being removed. But although the *preſence* of this circumſtance when connected with other characteriſtics of aneuriſm, may lead us to conclude, that every tumor *is of that nature* in which theſe happen to be combined, yet the *want* of it ought by no means to convince us that it is *not* of that kind; for it very frequently happens, particularly in the advanced ſtages of aneuriſms, that their contents become ſo firm and compact that no effect whatever is produced upon them by preſſure. Upon the whole, therefore, as in many inſtances of this diſeaſe, no certainty whatever can be obtained as to its real nature, in all ſuch caſes where there is any conſiderable degree of doubt, practitioners ought to lay it down as an eſtabliſhed rule, to proceed as if the tumor was in reality of the aneuriſmal kind. By doing ſo, they may perhaps in a few inſtances be prevented from opening tumors which they may afterwards find might have been done with ſafety: But the ſame rule, if ever it ſaves them, even in a ſingle inſtance, from thoſe diſagreeable reflections which every practitioner muſt experience on his having the misfortune to open an aneuriſm inſtead of a collection of matter; I ſay, this conſideration alone, muſt do much more than compenſate any leſſer inconveniences that can ever probably occur from any delay thus produced in opening a tumor of an ordinary nature.

But it is in the trunk of the body only, it muſt be obſerved, or in the neck, axilla, upper part of the thigh, or groin, that ſo much caution in tumors of this doubtful nature can be ever neceſſary. For when ſituated on the under part of any of the extremities,

tremities, or even on any acceſſible part of the head, as in ſuch caſes, when the ſwellings have proceeded to any conſiderable ſize, the operation for the aneuriſm ought always be performed, ſo there can never in ſuch circumſtances be any impropriety in having recourſe to it; for if, on laying the tumor open, it is found to be of the aneuriſmal kind, we are poſſeſſed of a very certain method of ſaving the patient from immediate danger: But, on other parts of the body where the tourniquet cannot be applied ſo as effectually to ſtop the diſcharge of blood, all ſuch tumors as appear to be of a doubtful nature, ſhould certainly be left untouched; for, by attempting to open them, great hazard is frequently incurred by the patient, and much diſtreſs of mind as well as loſs of character muſt enſue to any practitioner, who happens to be ſo unfortunate, as to open an aneuriſm inſtead of an ordinary collection of matter.

In forming a prognoſis in caſes of aneuriſm, three important circumſtances chiefly require our attention. The manner in which the diſeaſe appears to have been produced: The part of the body in which the ſwelling is ſituated: And laſtly, the age, and habit of body, of the patient.

If an aneuriſm has come forward in a gradual manner, without any apparent injury having been done to the part, and without having ſucceeded to any violent bodily exertion; there will then be great reaſon to ſuppoſe, that the diſeaſe depends upon ſome paralytic or other general affection either of the trunk of the veſſel in which it occurs, or perhaps of the whole arterial ſyſtem; ſo that no great ſucceſs is to be expected from any means to be attempted for the patient's relief; for the operation of the aneuriſm being performed on the part affected, there would be much reaſon to ſuſpect that the ſame cauſe which originally produced it here will have the effect of raiſing ſimilar ſwellings in other parts of the artery: Whereas, there is great reaſon to expect, if the tumor has evidently ſucceeded to a bruiſe, puncture, or other external accident, that the operation will be attended with complete ſucceſs, provided the circulation of the part is not altogether deſtroyed by the ligature to be put upon the artery.

In that ſpecies of the diſorder we have termed the Varicoſe Aneuriſm, we may generally venture on a more favourable prognoſis than in any other kind of aneuriſm: For it has been found in different inſtances, that the aneuriſmal tumor does not here proceed ſo rapidly as in other caſes; that ſo ſoon as it gets to a certain length, it does not afterwards acquire much additional ſize; and that any inconvenience produced by it, has been readily ſubmitted to by different patients for a great number of years.

It is in this circumſtance alone, we muſt obſerve, that any advantage occurs in the treatment of aneuriſms from Doctor Hunter's diſcovery of this ſpecies of the diſeaſe: And a very important diſcovery it is; for by means of it, a patient may be ſaved, not only from a very painful operation, but from that great degree of riſk which muſt always attend the deſtruction of the principal artery of a limb. In the event of a ſwelling of this nature arriving at ſuch a ſize as to produce much real diſtreſs, the operation ought no doubt to be had recourſe to; but, ſo long as any inconvenience ariſing from it can be eaſily ſubmitted to, the hazard which almoſt always attends this operation, and which nothing but neceſſity ought to indicate, ſhould certainly be avoided *.

The

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* In Volume II. Art. XXXVI. of London Medical Obſervations, two caſes are related of the varicoſe aneuriſm, by Dr Hunter. One of them at that time was of fourteen years ſtanding, and the other had ſubſiſted for five years, without being productive of any neceſſity for having recourſe to the operation. And in Vol. III. of the ſame work, Art. XIII. a ſimilar caſe of five years duration is related by Dr Cleghorn.

As it has been alleged by ſome practitioners, that no advantage reſults from the diſcovery of this ſpecies of aneuriſm, from their ſuppoſing that the uſual operation is as neceſſary in it as in any other variety of the diſeaſe; and as in different inſtances the operation has been put in practice even in the incipient ſtages of the diſorder, where no real neceſſity we think could occur for it; it therefore becomes a matter of ſuch importance as to merit a very attentive examination; and it is with much ſatisfaction that I communicate the following facts, as they tend to eſtabliſh as a certainty, that in the varicoſe aneuriſm, The ſituation of the tumor is the next circumſtance of importance requiring our attention. When an aneuriſmal ſwelling is ſo ſituated, that no ligature or effectual com-

the uſual operation of obliterating the cavity of the artery, is ſeldom, if ever, neceſſary.

In a letter I am favoured with from Doctor Hunter, he ſays, "The Lady in whom I firſt obſerved the varicoſe aneuriſm is now living at Bath in good health; and the arm is in no ſenſe worſe, although it is now thirty-five years ſince ſhe received the injury." And the Doctor farther obſerves, that he never heard of the operation being performed for the varicoſe aneuriſm that was known to be ſuch.

In a letter from Dr William Cleghorn of Dublin I am informed, that the caſe of varicoſe aneuriſm above-mentioned, as related in the 3d Volume of London Medical Obſervations, remains nearly in the ſame ſtate as at the time that account of it was made out, which was at leaſt twenty years ago; only that the veins are rather more enlarged. The patient recovered, and the limb became nearly as ſtrong and ſerviceable as the other. The man has all along continued his buſineſs of ſhoemaker, and has lately recovered from a ſprain in the affected arm, which he received in lifting a heavy burden.

In a letter from Mr Pott, whoſe opportunities for obſervation are great, he ſays, that he has met with three different inſtances of this ſpecies of aneuriſm, and that the operation never became neceſſary in any of them.

Among

compreſſion can be applied for putting a ſtop to the circulation in the part, if the artery is large, there would be the utmoſt hazard in opening it; as the patient, in all probability, would loſe more blood than his ſtrength could bear, before the artery could be ſecured. In aneuriſms ſo ſituated, therefore, particularly on any part of the trunk of the body, on the neck, axilla, or groin, there can never be any good foundation for a favourable prognoſis. On the contrary, indeed, in ſuch ſituations, the greateſt danger is always to be apprehended: For the force of the arterial pulſation is at laſt ſure to overcome the reſiſtance of the coats with which the tumor is ſur-

Among other inſtances of varicoſe aneuriſm which have appeared here, a young man from Paiſley, who had the misfortune to meet with it ſeveral years ago, was examined by different ſurgeons of this place. The diſeaſe was very clearly marked, and no operation was adviſed. In a letter from Mr Hamilton profeſſor of Anatomy in Glaſgow, I am informed, that this man is now ſerving in the Navy, where he undergoes great fatigue without any inconvenience from the aneuriſm, although it is now of thirteen years ſtanding.

ſurrounded; and in ſuch an event, the moſt fatal conſequences are to be apprehended.

In the upper parts of any of the extremities, too, where all the arteries of the limb are centered in one common trunk, the ſucceſs of the operation for the aneuriſm muſt always be doubtful. But although this is undoubtedly the caſe in the ſuperior parts of the extremities, yet in lower ſituations of the ſame parts, even the principal artery of the limb may be operated upon with a very fair proſpect of ſucceſs; for after the great artery of a member has crept along the upper part of it, a number of ſmall branches are always ſent out, which anaſtomozing not only with ſimilar branches below, but by their means with the under part of the large artery itſelf, theſe, in the event of the common trunk from whence they ſprung being deſtroyed, come to dilate to ſuch an extent as to carry on the circulation of the inferior part of the limb much more completely than could *à priori* be expected. We would not naturally ſuppoſe, after the principal artery of a part has been obliterated, that the circulation would there be afterwards carried on with any tolerable degree of force ;and yet numberleſs inſtances have occurred of the large brachial artery being completely deſtroyed by ligature, without being productive of much inconvenience to the parts below; and the ſame circumſtance has alſo happened, where the operation for the aneuriſm has been performed on the trunk of the great femoral artery *.

From

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* In one caſe, the operation for the aneuriſm was performed with the moſt complete ſucceſs, on the trunk of the femoral artery, about two hand-breadths from the groin, by the late Mr Hamilton profeſſor of Anatomy in Glaſgow. And what rendered this caſe more remarkable, was, that after the trunk of the large artery was ſecured by the ligatures, it was neceſſary to perform the operation again upon a ſmall branch of an artery which had been wounded, even farther up than the principal trunk.

For ſome time after the operation the limb remained colder than the other, and it was upwards of a week before any pulſation could be felt in the artery at the ankle. In two months from the operation, the wound was completely healed, and the circulation and heat returned;

From what has been ſaid, therefore, it muſt appear, that when an aneuriſm is ſo ſituated, that compreſſion cannot be applied ſo as to ſecure the patient from the loſs of much blood during the operation, nothing of this kind ſhould ever be attempted; and in ſuch caſes the prognoſis ought certainly

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returned; and in a ſhort time thereafter, the patient had ſo far recovered the uſe of his limb, as to be able to take very violent exerciſe.

Theſe particulars I thought it right to communicate, as the caſe of this patient is one of a very few well authenticated inſtances, of this operation having been attempted on the femoral artery ſo near to its origin; and the ſucceſs attending it ſurely points out the propriety of having recourſe to the operation, in every aneuriſm of theſe parts that does not evidently ariſe from a general debility of the coats of the artery. And as I am favoured with this account of the caſe from the preſent profeſſor of Anatomy in Glaſgow, Mr Hamilton, ſon to the late profeſſor, its authenticity may be depended on.

In Vol. III. Article XII. of the London Medical Obſervations, there is another inſtance related of the operation for the aneuriſm having been performed on the trunk of the femoral artery, by Mr Burchal ſurgeon in Mancheſter; the patient recovered, and the limb became nearly as ſtrong and as ſerviceable as the other.

to be very unfavourable. And on the on the contrary, whenever an aneuriſm, produced by external violence, is ſeated on any of the extremities, where we are ſure of commanding the circulation, the operation ought always to be undertaken, ſo ſoon as, from appearances, there is the leaſt reaſon to ſuſpect that the tumor if left to itſelf might burſt, ſo as to endanger the life of the patient.

The ſucceſs of this operation, depending in a great degree upon the probable chance there is for the circulation afterwards going on in the under part of the member, our prognoſis in every caſe of aneuriſm, ought, *cæteris paribus*, to be more or leſs favourable, according as the diſorder is ſeated higher or lower on the different extremities: For the riſk of the circulation being hurt by it, is always in proportion to the height of the tumor; according as it is higher or lower, this riſk is always increaſed or diminiſhed.

But laſtly, whether an aneuriſm has been produced by an external injury, or by the effects of internal diſeaſe, and whatever may be its ſituation, the habit of body and age of the patient ought to have a conſiderable influence, in forming the opinion of practitioners as to the effects to be expected from the operation. In no operation, indeed, that we are acquainted with, are the advantages derived from health and youth, more conſpicuous than in this; for in the earlier periods of life, all the ſofter parts accommodate themſelves much more readily to the neceſſity of any great change, than is ever experienced in the more advanced ſtages of old age. In the latter, all the animal fibres have acquired ſuch a degree of firmneſs and ſolidity, as to be rendered almoſt incapable of diſtenſion; and this ſeems to be particularly the caſe with the arterial ſyſtem, which at laſt is often known to proceed even to a ſtate of oſſification: So that at this period of life, we may readily ſuppoſe the ſmaller arteries to be rendered altogether incapable of that degree of diſtenſion neceſſary for ſupplying the want of the principal artery of a part, and which in the more early periods of life they might with great eaſe have admitted of.

Different degrees of ſucceſs in this operation having occurred to different practitioners, even where the aneuriſmal tumors were apparently in every reſpect ſimilar both as to ſituation and other circumſtances, various reaſons have been ſuggeſted to account for this. With ſome the operation has ſucceeded, even under circumſtances apparently more unfavourable, than with others where it failed. Thus it has been known to anſwer, as we have lately remarked, ſeveral inches above the knee, when the trunk of the femoral artery was for certain taken up by the ligature; and in others, it has failed when done in the ham: That is, in the former, the circulation in the under part of the leg was ſtill preſerved, and the patients recovered; while in the latter, where ſucceſs might more readily have been expected, the limbs remained cold after the operation, no return of circulation took place, mortification at laſt was induced, and death itſelf ſupervened.

From this variety of ſucceſs attending it, we find very contradictory opinions held forth reſpecting this operation. While one condemns it as being never productive of any good, except in the very extreme parts of a member; others aſſert, that even the largeſt artery of a limb may be operated upon with great probability of ſucceſs.

Theſe two opinions, however, may, I think, be eaſily reconciled upon this circumſtance of age; for, to the different powers of diſtenſion with which the arterial ſyſtem is endowed at different periods of life, much of the ſucceſs attending this operation may with good reaſon be attributed: So that, although in an old infirm perſon, it may have been found to fail perhaps in the under part of the leg or arm, this ſhould by no means deter us from having recourſe to it, even in much higher ſituations, in patients that are young and healthy.

Having thus conſidered the uſual appearances and cauſes of aneuriſm, together with the grounds upon which a juſt prognoſis is to be formed, we ſhall now proceed to the method of cure.

SECTION II.

Of the Treatment of Aneuriſms.

IN every caſe of aneuriſm the uſe of preſſure has been indiſcriminately recommended, not only in the incipient period of the diſeaſe, but even in its more advanced ſtages. In a former chapter on blood-letting, as well as in ſome parts of this, different opportunities occurred for introducing the conſideration of this ſubject: To theſe we muſt now refer; and ſhall at preſent attend to ſuch points only as were not before ſo particularly entered into.

In the diffuſed or falſe aneuriſm preſſure has been univerſally adviſed, not only with a view to diſſipate the ſwelling already induced, but in order to produce a reunion of the wound in the artery: We have already made it appear, however, as preſſure in ſuch caſes cannot be applied to the artery alone, without at the ſame time affecting the refluent veins; and as this circumſtance, by producing an increaſed reſiſtance to the arterial pulſations, muſt undoubtedly force an additional quantity of blood to the orifice in the artery, that therefore no advantage is to be expected from it; but, on the contrary, that on many occaſions there is reaſon to ſuppoſe it has been productive of miſchief.

But although preſſure ought never to be attempted in any period of the diffuſed aneuriſm, yet in ſome ſtages of the other ſpecies of the diſeaſe, it may be often had recourſe to with advantage.

In the early ſtages of encyſted aneuriſm, while the blood can be yet preſſed entirely out of the ſac into the artery, it often happens, by the uſe of a bandage of ſoft and ſomewhat elaſtic materials, properly fitted to the part, that much may be done in preventing the ſwelling from receiving any degree of increaſe; and on ſome occaſions, by the continued ſupport thus given to the weakened artery, complete cures have been at laſt obtained. In all ſuch caſes therofore, particularly in every inſtance of the varicoſe aneuriſm, which we have already endeavoured to ſhow, can very ſeldom require the uſual operation, much advantage may be expected from moderate preſſure.

But although preſſure to a certain degree has frequently in caſes of encyſted aneuriſm proved very uſeful, it ought never to be carried to any great length; for tight bandages in all ſuch affections, by producing an immoderate degree of reaction in the containing parts to which they are applied, inſtead of anſwering the purpoſe for which they were intended, have evidently the contrary effect. Moderate compreſſion, therefore, is more eligible than a great degree of it; and indeed the greateſt length to which preſſure in ſuch caſes ought to go, ſhould be, to ſerve as an eaſy ſupport to the parts affected, and no farther.

While at the ſame time we have recourſe to this remedy of compreſſion, other means ought not to be omitted: The patient ſhould be kept upon a low diet; when neceſſary, ſome blood ſhould be evacuated; the bowels ſhould be kept lax; and all violent exerciſe, particularly of the part affected, ſhould be carefully guarded againſt. In the latter ſtages of aneuriſm, when much tenſion and pain are induced, opiates are found very uſeful; and in many ſuch ailments they are the only claſs of remedies from which any relief is obtained.

The treatment here recommended applies to every aneuriſm not intended to be operated upon; but it is particularly proper in all ſwellings of this kind ſituated on the trunk of the body and other parts where the operation is inadmiſſible. In ſuch ſituations, indeed, an eaſy ſupport by means of gentle compreſſion, a low diet in order to prevent a plethoric ſtate of the veſſels; repeated blood-lettings when plethora actually exiſts; a total abſtinence from exerciſe; and the uſe of opiates when indicated by pain; are the only remedies from which much utility is to be expected.

Having thus pointed out the different remedies to be employed where the operation

tion is either not conſidered as proper, or where it is rendered inadmiſſible by the ſituation of the ſwelling, we ſhall now proceed to deſcribe the operation itſelf, on the ſuppoſition of its having become neceſſary, either from the means recommended for the previous treatment of the diſorder having failed, or from the tumor having made too great progreſs before proper aſſiſtance was procured.

The firſt ſtep in this operation ought to be, to obtain a full command of the circulation in the inferior part of the member by means of the tourniquet applied above. This being done, the patient ſhould be ſo placed, that the diſeaſed limb, on being ſtretched on a table, is found to be of a proper height for the ſurgeon, who, as the operation is generally tedious, ought to be ſeated. The limb being in this ſituation properly ſecured by an aſſiſtant, the operator is now with a ſcalpel to make an inciſion through the ſkin and cellular ſubſtance, along the whole courſe of the tumor; and as freedom in the remaining parts of the operation, is here a matter of much importance, it is even of uſe to carry this external inciſion half an inch or ſo, both above and below the fartheſt extremities of the ſwelling: No miſchief can occur from the firſt inciſion being made very free and extenſive; and I have ſeen different inſtances of the operator being much embarraſſed in the ſubſequent ſteps of the operation, by too much timidity or perhaps ill-judged lenity in this part of it.

This being done, the ordinary method is, to proceed in a very ſlow, cautious manner, diſſecting away one layer of the membrane after another, till the artery itſelf is laid bare. In this manner the operation is always rendered exceedingly tedious, as the thickneſs of parts with which the artery is found covered, is often really aſtoniſhing, by one layer of a membranous ſubſtance having been formed after another, from the coagulable liymph of the blood contained in the tumor. In reality, however, there is no neceſſity for this degree of caution, as the operation may in the following manner be equally well performed, in a much ſhorter ſpace of time, and with much leſs pain to the patient.

So ſoon as the external inciſion has been made in the manner directed, ſo as to divide the ſkin and cellular ſubſtance, all the effuſed blood ought to be wiped off by means of a ſpunge; and the ſofteſt part of the tumor being diſcovered, an opening ought there to be made into it with a lancet, large enough for admitting a finger of the operator's left hand. This being done, and the finger introduced into the cavity of the tumor, it is now to be laid open from one extremity to the other, by running a blunt-pointed biſtoury along the finger from below upwards, and afterwards from above downwards, ſo as to lay the whole cavity fairly open. In Plate VII. fig. 1. there is an exact repreſentation of this biſtoury, with a curve much leſs than uſual, as a very ſlight concavity anſwers every purpoſe, and cuts more eaſily than a greater degree of curvature.

The cavity of the tumor being thus laid freely open, all the coagulated blood is now to be taken out: For which purpoſe, a number of inſtruments, particularly ſcoops, have been invented by different operators: but no inſtrument anſwers this intention ſo effectually, and with ſo much eaſe to the patient, as the fingers of the operator; who having in this manner removed all the coagulated blood, together with a number of tough membranous filaments commonly found here, the cavity of the tumor is now to be rendered quite dry, and free from the blood which on the firſt opening of the ſwelling is diſcharged into it from the veins in the inferior part of the member; and this being effectually accompliſhed, the tourniquet muſt be made perfectly ſlack and eaſy, in order to diſcover not only the artery itſelf, but the opening into it from whence the blood collected in the tumor has been all along diſcharged. This being done, the next point to be determined, is, the manner of ſecuring this opening into the artery, ſo as to prevent in future any farther effuſion blood. Various means have been propoſed for accomcompliſhing this; but the effects of all of them may be comprehended under the three following heads.

I. The effects of ligature upon a large artery, having on ſome occaſions proved fatal to the inferior part of the member, it was long ago propoſed, that ſo ſoon as the opening into the artery has been diſcovered, inſtead of applying a ligature round it, which for certain is to obliterate its cavity entirely, a piece of agaric, vitriol, alum, or any other aſtringent ſubſtance, ſhould be applied to the orifice, in order if poſſible to produce a reunion of its ſides.

II. Upon the ſame principle with the preceding, viz. that of ſtill preſerving the circulation in the artery, it was ſeveral years ago propoſed by an eminent Surgeon of Newcaſtle, Mr Lambert, that the orifice in the artery ſhould be ſecured by means of the twiſted ſuture. A ſmall needle being puſhed through the edges of the wound, they are then directed to be drawn together by a thread properly twiſted round the needle, as was formerly directed when treating of the ſubject of ſutures *.

Strong objections, however, occur to both of theſe methods. In the firſt place, no aſtringent application with which we are acquainted, is poſſeſſed of ſuch powers as to deſerve much confidence; for, although different articles of this kind have on various occaſions proved a means of putting a temporary ſtop to hæmorrhagies, yet there are very few inſtances properly authenticated, of their having produced any permanent advantage. In almoſt every inſtance in which they have been uſed, the hæmorrhagy has recurred again and again, ſo as to prove very diſtreſſing, not only to the patient, but to the practitioner in attendance; ſo that from this want of ſucceſs, little or no attention is now paid to remedies of this kind in ordinary practice.

With regard to Mr Lambert's method of ſtitching the orifice in the artery, it is certainly

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* Vide London Medical Obſervations, Vol. II. Article xxx.

certainly a very ingenious propoſal, and would in all probability, at leaſt in moſt inſtances, prove an effectual ſtop to all farther diſcharge of blood; but as it has hitherto, at leaſt ſo far as I have heard, been only attempted in one inſtance, farther experience of its effects is neceſſary before the method propoſed can with propriety be either rejected or approved. But, if in ſuch a matter reaſoning may be indulged, we would beg leave to obſerve, that two material objections occur to this practice. One is, that in the operation for the aneuriſm, in almoſt every inſtance, a very few only excepted, the artery lies at the back part of the tumor; ſo that when all the collected blood is removed, there is ſuch a depth of wound, that it muſt be always a very difficult matter, and on many occaſions quite impracticable, to perform this nice operation upon the artery, with that attention and exactneſs, which, in order to inſure ſucceſs, it certainly requires. It has now and then happened indeed, that in this operation the artery has been found to be on the anterior part of the tumor, and in ſuch a ſituation the wound in it would no doubt prove acceſſible enough. This, however, is a very rare occurrence, as in almoſt every inſtance of diffuſed aneuriſm, the artery lies at the very bottom of the tumor, by the blood being collected between it and the common teguments; and accordingly I have ſeen ſeveral inſtances of this diſorder, in which, after the tumor was laid freely open, the artery was found to lie ſo deep as would have rendered it quite impoſſible to perform this operation.

But there is another very material objection which *à priori* evidently occurs to the practice recommended by Mr Lambert. By introducing a needle through the ſides of the orifice, and drawing theſe together by a ligature, the cavity of the artery muſt undoubtedly be at that point much diminiſhed. Indeed Mr Lambert, in his account of the caſe in which this operation was performed, acknowledges that the diameter of the artery was thereby diminiſhed. Now, the paſſage of the blood being thus contracted at one point, the impulſe upon that particular part muſt be very conſiderable: So that the very remedy employed for the cure of one ſpecies of aneuriſm, will in all probability prove a very powerful agent in inducing another; for the blood being thus obſtructed in its uſual courſe, there will be no ſmall danger incurred, of a dilatation being produced immediately above this preternatural ſtricture.

I muſt fairly acknowledge, however, that all I have advanced, proceeds from reaſoning alone, and is not as yet ſupported by experience. But, if farther trials of this operation tend to ſhow that the objections now ſtated againſt it are not well founded, no perſon whatever will be more ready than I ſhall be in adopting it; for, abſtracting from theſe objections, this operation as propoſed by Mr Lambert, I ſhould conſider as deſerving to be ranked among the moſt important improvements which in modern times ſurgery has acquired. In the treatment of aneuriſm by the common operation, if the principal artery of a limb is concerned, ſome riſk is always incurred, not only of injuring the parts below in a moſt material manner, but even of deſtroying them entirely, by depriving them of the quantity of blood neceſſary for their ſupport. Now, by Mr Lambert's improvement, an effectual ſtop is put to the farther evacuation of blood, while at the ſame time the circulation in the diſeaſed artery is ſtill preſerved; ſo that if farther experience of its effects, ſhall ſhow that the objections we have ventured to bring againſt it are not well founded, it will deſervedly be admitted as a very material improvement in the treatment of this ſpecies of aneuriſm.

III. Neither of the methods we have yet been conſidering, being found eligible for ſecuring the orifice in the artery, we ſhall now proceed to deſcribe the ordinary manner of performing this operation, which conſiſts in obliterating the arterial cavity entirely, by means of ligatures; and the method of doing it is this.

The artery being laid bare in the manner directed, and all the coagulated blood being carefully removed from the cavity of the tumor, on the tourniquet being now ſlackened ſo as to bring the orifice in the artery into view, a ſmall probe is to be introduced at the opening, with a view to raiſe the artery from the neighbouring parts, ſo as that the ſurgeon may be enabled with certainty to paſs a ligature round it, without comprehending the contiguous nerves, which in general run very near to the large blood-veſſels of a limb. By this precaution, the nerves may be always avoided; and by doing ſo, a great deal of miſchief may be prevented, which otherwiſe in all probability might ſupervene. When the diſorder is ſituated either in the ham, or in the uſual part of blood-letting in the arm, bending the joints of the knee or of the elbow, as it relaxes the artery a little, renders this part of the operation more eaſily effected, than when the limbs are kept fully ſtretched out.

The artery being thus gently ſeparated from the contiguous parts, a firm, broad, waxed ligature muſt be paſſed round it, about the eighth part of an inch or ſo above the orifice, and another muſt in the ſame manner be introduced at the ſame diſtance below it. Much harm, I am convinced, has been done by paſſing the ligature ſo far diſtant from the orifice as is commonly practiſed; for the riſk of loſing the benefit of anaſtomoſing branches will be always increaſed in proportion to the extent of artery included between the ligatures.

The eaſieſt method of introducing the ligatures, is by means of a blunt curved needle; and the form repreſented in Plate V. fig. 2. will be found more convenient for this purpoſe than any other. An ordinary ſharp needle is commonly made uſe of for this purpoſe; but it does not anſwer the intention ſo well as the one here recommended: By the ſharpneſs of its points it is apt to injure the contiguous parts; and when the common crooked needle is uſed with a ſharp edge on its concave ſide, there muſt even be ſome riſk of its wounding the under part of the artery, as in this ſituation it cannot be introduced without making this part of the needle paſs quite in contact with the coats of the artery. The blunt needle is not liable to either of theſe objections; and beſides, when of the form here repreſented, it is more eaſily introduced than any of the ordinary aneuriſmal needles.

The ligatures being both paſſed in the manner directed, the upper one is now to be tied with a firmneſs ſufficient for compreſſing the ſides of the artery. The directions formerly given for forming the knot upon bleeding-veſſels in other parts, will apply with equal propriety here: The ends of the ligature ought by all means to be twice paſſed through the firſt nooſe, and this ſhould again be farther ſecured by a ſingle knot made above it. By many writers on this ſubject, a ſmall bolſter of linen is ordered to be inſerted between the artery and the knot, in order to prevent the artery from being cut by it. This, however, is a very unneceſſary precaution; for if the whole artery is not ſurrounded with the bolſter, it will be juſt as much expoſed to be cut by the ligature at any other part, as where the knot is fixed: And, beſides, as we have already very fully remarked, there is no occaſion whatever for making the ligature ſo tight on arteries as to run any riſk of dividing them; a much leſs degree of preſſure than is either commonly applied, or than could have any influence in hurting them, being fully ſufficient for compreſſing them in the moſt effectual manner.

The upper ligature being thus finiſhed, before the knot is paſſed upon the other below the orifice, the tourniquet ought to be untwiſted, in order to ſee whether any blood is now diſcharged by the wound in the artery or not. If blood flows in any conſiderable quantity, it affords a pleaſant proſpect of the ſucceſs with which the operation will in all probability be attended, as it clearly ſhows, that the anaſtomoſing branches from the ſuperior part of the artery are conſiderable enough for carrying on at leaſt a tolerable degree of circulation in the under part of the member. At the ſame time, however, although blood ſhould not be diſcharged at this time by the orifice, we are by no means, from thiscircumſtance alone, to deſpair of ſucceſs; for it frequently happens that theoperation ſucceeds in a very effectual manner, although no blood whatever is diſcharged on the trial now recommended.

But whether any blood ſhould be diſcharged by this trial or not, we are not to reſt ſatisfied with one ligature; for unleſs the ligature below the orifice be alſo tied, there is always a riſk, on the return of circulation to the under part of the artery, of blood paſſing out at the orifice: This precaution, therefore, ſhould never be omitted; it is eaſily done, and it renders the patient quite ſecure againſt all farther evacuation of blood by the orifice. After the knots have been put upon the ligatures, theſe ſhould be cut of ſuch a length that their ends may lie fully out over the edges of the wound, ſo that when neceſſary they may be more eaſily withdrawn.

By way of greater ſecurity in this operation, it has been adviſed to inſert other two ligatures quite contiguous to the former, and to leave them untied, ſo that if any of the others miſgive its place may be immediately ſupplied.

There is not, however, any neceſſity for this precaution, for, if the firſt ligatures are properly applied, there can be no doubt of their anſwering the purpoſe; and in caſe either one or both of them ſhould happen to fail, they can be very eaſily renewed: In the mean time, too, the patient is rendered ſafe againſt any ſudden loſs of blood by the tourniquet being left looſe upon the upper part of the member, which it ought by all means to be for ſeveral days after the operation, ſo that, in the event of blood burſting from the wound, it may be ſecured by means of it, much more readily than if it depended on the tying of a ligature.

The ligatures being both finiſhed in the manner directed, the tourniquet is now to be made quite looſe, and if no blood is diſcharged at the orifice in the artery, we may then reſt ſatisfied that the operation is ſo far properly completed.

The woundis now to be lightly covered with ſoft lint, with a pledget of any emollient ointment over the whole; and a compreſs of linen being applied over the dreſſings, all the bandage in any degree requiſite, is, two or three turns of a roller above, and as many below the centre of the wound, making it preſs with no more tightneſs than is abſolutely neceſſary for retaining the applications we have juſt now mentioned.

The patient being now put into bed, the member ſhould be laid in a relaxed poſture upon a pillow, and ought to be ſo placed as to create the leaſt poſſible uneaſineſs from the poſture in which it is laid.

As the operation for the aneuriſm is always tedious, and produces much pain and irritation, a full doſe of laudanum ſhould be given immediately on the patient being got into bed. In order to diminiſh ſenſibility during ſome of the more capital operations, I have made different trials of opiates given an hour or ſo before the operation: On ſome occaſions, this proved evidently very uſeful, but in others it ſeemed to have the contrary effect; particularly in weak, nervous conſtitutions, in which with any doſes I ever ventured upon, they appeared to be rendered more irritable and more ſuſceptible of pain, than if no opiate had been given. Immediately after this operation, however, an opiate ought to be exhibited, to be repeated occaſionally according to the degrees of pain and reſtleſsneſs.

In ſome few caſes of aneuriſm it has happened, that the pulſe in the under part of the member has been diſcovered immediately after the operation. This, however, is a very rare occurrence: For as this diſorder is ſeldom met with in any other part than at the joint of the elbow as a conſequence of blood-letting, and as it rarely happens that the brachial artery divides till it paſſes an inch or two below that place, the trunk of this artery is therefore moſt frequently wounded; and when accordingly the ligature in this operation, is made to obliterate the paſſage of almoſt the whole blood that went to the under part of the arm, there cannot be the leaſt reaſon to expect any pulſation at the wriſt, till in a gradual manner the anaſtomoſing branches of the artery have become ſo much enlarged, as to tranſmit ſuch a quantity blood to the inferior part of the member, as is ſufficient for acting as a ſtimulus to the larger branches of the artery.

Immediately after the operation, the patient complains of an unuſual numbneſs or want of feeling in the whole member; and as it generally for a few hours becomes cold, it is therefore right to keep it properly covered with warm ſoft flannel; and in order to ſerve as a gentle ſtimulus to the parts below, moderate frictions appear to be of uſe. In the ſpace of ten or twelve hours from the operation, although the numbneſs ſtill continues, the heat of the parts generally begins to return; and it frequently happens in the courſe of a few hours more, that all the inferior part of the member becomes even preternaturally warm.

Although phyſiological diſcuſſions are not immediately connected with our ſubject, and although for that reaſon we ſhall not frequently enter into them; yet we cannot here avoid remarking the very clear proof which after this operation always occurs, of the great dependence one part of the human frame has upon another. The nerves we know to be the inſtruments of ſenſe and motion; but on being deprived of their uſual ſupport from the ſanguiferous ſyſtem, their influence immediately diminiſhes.

Immediately after this operation, the want of feeling in the parts is often very great; and in proportion as the circulation in the under part of the member becomes more conſiderable, the degree of feeling alſo augments. If we could ſuppoſe the nerves of the parts below to be always included in the ligature with the artery, that numbneſs which ſucceeds immediately to the operation, might be eaſily accounted for; but I have known it happen, when I was certain that nothing but the artery was ſecured by the ligature: And beſides, although the knot upon the nerves would account for the immediate loſs of ſenſibility which ſucceeds to the operation, it would not in any degree ſerve to explain the return of feeling on the circulation being again reſtored; for the nerve having been deſtroyed by the effects of the ligature, if the want of feeling produced here originated entirely from that circumſtance, it could not be expected to be much influenced by the return of blood to the part.

In the mean time the patient being properly attended to as to regimen, by giving him cordials and nouriſhing diet when low and reduced, and confining him to a low diet if his conſtitution is plethoric, the limb being ſtill kept in an eaſy relaxed poſture, towards the end of the fourth or fifth day, ſometimes I have known it much ſooner, a very weak feeble pulſe is diſcovered in the under part of the member, which becoming ſtronger in a gradual manner, the patient in the ſame proportion recovers the uſe and feeling of the parts.

So ſoon as there is an appearance of matter having formed freely about the ſore, which will ſeldom happen before the fifth or ſixth day, an emollient poultice ſhould be applied over it for a few hours, in order to ſoften the dreſſings, which may be then removed. At this time, too, the ligatures might be taken away; but as their continuance for a day or two longer can do no harm, it is better to allow them to remain till the ſecond or third dreſſing, when they either drop off of themſelves, or may be taken away with perfect ſafety. The dreſſings, which ſhould always be of the ſofteſt materials, being renewed every ſecond or third day according to the quantity of matter produced, the ſore is in general found to heal very eaſily; and although the patient may for a conſiderable time complain of a great degree of numbneſs and want of ſtrength in the whole courſe of the diſeaſed limb, yet in moſt inſtances a very free uſe of it is at laſt obtained.

It will be readily ſuppoſed, that the termination of this operation as we have here deſcribed it, is the moſt favourable that can poſſibly happen. In ſome inſtances, the ſucceſs attending it is far from being ſo complete: Inſtead of a return of circulation, and of the feeling and uſe of the parts, they remain cold and inſenſible, and no marks of returning life are perceived. From a mere want of blood, therefore, mortification at laſt commences; and as nature is here deprived of one of her principal agents for the removal or ſeparation of gangrenous parts, I mean the efforts of the ſanguiferous ſyſtem, whenever the parts in ſuch circumſtances begin to mortify, nothing can prevent their progreſs to the ultimate ſtage of that malady.

Whenever mortification enſues, therefore, as a conſequence of this operation, if the patient ſurvives the immediate effects of it till a ſeparation occurs between the healthy and diſeaſed parts, amputation of the member will then be the only reſource.

That this operation when practiſed upon the principal artery of the ſuperior part of a member, does now and then terminate in this manner, no practitioner of experience will deny; but its doing ſo in ſome inſtances, is not a ſufficient reaſon for rejecting it in every caſe. The event of every capital operation we know to be very uncertain; and it is in this as in every other of equal importance, that as we cannot in any caſe ſay with preciſion how it is to anſwer, ſo we are never to put it in practice where means of a leſs hazardous nature will ſucceed: And on the contrary, whenever theſe are found to fail, ſo that the patient's life will be in danger if this operation is not performed, it ought without farther heſitation to be employed.

CHAP. V.

Of HERNIÆ.

SECTION I.

Of Herniæ in general.

THE term Hernia might with propriety be applied, to every ſwelling occaſioned by the diſlodgement of parts from thoſe boundaries within which in a ſtate of health they are contained; but the general acceptation of the term, implies a tumor produced by the protruſion of ſome part or parts from the cavity of the abdomen.

The parts in which theſe ſwellings uſually appear, are the groin, ſcrotum, labia pudendi, the upper and fore part of the thigh, the umbilicus, and in different points between the interſtices of the abdominal muſcles.

If the ſituation of ſuch tumors be various, the viſcera which produce them are ſtill more ſo; inſtances having occurred of the ſtomach, uterus, liver, ſpleen, and bladder, being found to form their contents. But a part of the inteſtinal canal, or a portion of the omentum, are from experience known to be the moſt frequent cauſe of their formation.

From theſe circumſtances of ſituation and contents, all the different appellations are derived by which herniæ are diſtinguiſhed. Thus they are termed Inguinal, Scrotal, Femoral, Umbilical, and Ventral; from their appearing in the groin, ſcrotum, thigh, navel, or belly. When the tumor is confined to the groin, the hernia is ſaid to be *incomplete*, and is termed Bubonocele; but, when the ſwelling reaches down to the bottom of the ſcrotum, the rupture is then ſuppoſed to be *complete*, and the diſeaſe obtains the name of *ſcrotal rupture*, or *oſchiocele.*

When a portion of gut alone forms the tumor, it is called an *enterocele*, or *inteſtinal hernia;* when a piece of omentum only has got down, it is termed *epiplocele*, or *omental hernia*; and if both inteſtine and omentum are down, it is called an *entero-epiplocele*, or *compound rupture.*

As all the abdominal viſcera are apparently contained within the cavity of the peritonæum, and as it was thought impoſſible for that membrane to admit of ſuch a degree of diſtenſion, as to ſurround tumors containing ſuch large portions of the different viſcera as are at times protruded, it was therefore commonly ſuppoſed, that in at leaſt the greateſt number of caſes of hernia, the peritonæum muſt certainly be burſt or ruptured; and from this the term Rupture was in all ſuch inſtances ſuppoſed to be applied with propriety enough. The idea was farther confirmed too, from its having been obſerved, that in caſes of ſcrotal hernia, the protruded viſcera were in ſome inſtances found in contact with the teſticle; a circumſtance, which was ſuppoſed impoſſible to happen, if the peritonæum had not been previouſly ruptured.

Since the anatomy of theſe parts, however, was better underſtood, this circumſtance, of parts protruded from the abdomen, being on ſome occaſions found in contact with the teſticle, is explained in a more ſatisfactory manner than on the ſuppoſition of a rupture of the peritonæum; an occurrence which we ſuppoſe will very rarely happen, in any other manner than from external violence: But as the nature of theſe diſorders cannot be properly underſtood without a previous knowledge of the anatomy of the parts concerned, it will be proper, before proceeding farther, to exhibit a deſcription of ſuch as here become the more immediate ſubjects of operation; and theſe are, a part of the abdominal muſcles; the peritonæum; teſticles; and ſpermatic veſſels.

The ſides and other fleſhy boundaries

of the abdomen are formed by five pairs of muſcles; *viz.* the recti, pyramidales, tranſverſales, obliqui interni, and obliqui externi.

In ſome ſubjects, the pyramidales are wanting; and as the obliqui externi are in general thoſe which in caſes of hernia come to be moſt connected with the diſorder, we ſhall here confine our deſcription to the anatomy of theſe only.

The obliqui externi, are two thin, broad muſcles: on their poſterior and upper parts they are fleſhy; and tendinous on their anterior and lower parts. They originate from the eighth, ninth, and inferior ribs, by fleſhy portions which intermix in a ſerrated manner with correſponding parts of the latiſſimus dorſi, ſerratus major anticus, pectoralis major, and intercoſtales: And afterwards becoming tendinous, they form the greateſt part of all the anterior ſurface of the abdomen, and are inſerted into the linea alba, the ſpine of the os ileum, and into the os pubis. On each ſide of the under part of the abdomen

men immediately above the pubis, two openings are met with in theſe tendons, intended for the paſſage of the ſpermatic veſſels in men, and for the ligaments of the womb in women. Theſe openings, or rings as they are termed, which ſeem to be formed merely by a ſeparation of the fibres of the tendon from one another, are of an oval figure, and have an oblique direction from the ſpine of the ileum downwards; they are ſomewhat wider above than below, and are rather of a larger ſize in men than in women.

Although theſe rings or openings have been commonly deſcribed as paſſing thro' not only the external oblique, but the tranſverſales and internal oblique muſcles alſo; yet it is now certainly known, that it is in the tedinous parts of the external oblique muſcle only, that any ſuch opening exiſts. It is of ſome importance to beginners to be thoroughly acquainted with this circumſtance; for, by the accounts received of it from books, one is led to ſuppoſe, that, inſtead of one diſtinct paſſage, there are always three to be met with here. Theſe muſcles are likewiſe perforated in the middle by the umbilicus, which affords a paſſage for the connecting veſſels between the mother and uterine fœtus, and which is continued through life, being filled up by cellular ſubſtance only.

From the inferior border of the tendinous part of the external oblique muſcle, a detachment of fibres is ſent off, which, after affording a firm covering to the inguinal glands, are loſt in the faſcia lata of the thigh: And the under edge of this tendon being folded inwards, obtains the appearance of a ligament, which ſtretches from the fore part of the os ileum to the pubes, forming a kind of arch, through which paſs the great blood-veſſels of the lower extremity. It is this ligamentous-like portion of the external oblique muſcle, which is known by the appellation of Poupart's or Fallopius's ligament.

This paſſage for the blood-veſſels of the thigh, being larger in women than in men, owing to the greater ſize of the pelvis in the former, by which the arch formed by Poupart's ligament is rendered both longer and wider; ſo in them the crural hernia, or that ſpecies of the diſeaſe formed by a protruſion of parts through this paſſage, is found to occur much more frequently than in men.

The internal ſurface of the muſcles of the abdomen, together with every other part of that cavity, is lined with a ſmooth ſomewhat elaſtic membrane, termed Peritonæum. This membrane, beſides lining the cavity of the belly, furniſhes the external covering to almoſt every viſcus contained in it; but, in ſo ſingular a manner are theſe coverings produced, that altho' at firſt ſight the different viſcera appear all to be contained *within* the cavity of the peritonæum, yet on a minute examination they are in reality found to *lie behind it.*

The peritonæum, after having completely lined the cavity of the abdomen, is continued or reflected over all the viſcera, ſo as to give an external covering to each. After ſurrounding one viſcus, it ſtretches along to the moſt contiguous, forming in its courſe the ſupporting membranous ligaments of the liver and other viſcera; and affording in its duplicature a kind of ſupport or connection to the various blood-veſſels, as they ſtretch along to their deſtined ſituations in the inteſtinal canal and other organs.

Behind the peritonæum lies a quantity of looſe cellular ſubſtance, by authors commonly termed its appendix. In ſome parts this ſubſtance is filled with fat; and in others it is empty, and can eaſily be filled with air.

The teſtes in the fœtus are, till near the period of delivery, lodged in the cavity of the abdomen, in the ſame manner with the reſt of the abdominal viſcera. They are ſituated immediately below the kidneys, on the fore part of the pſoæ muſcles, near to the upper end and by the ſide of the rectum, being poſteriorly fixed to the parts on which they reſt by their external covering adhering to them, while all their anterior and lateral ſurfaces lie looſe in the abdominal cavity in contact with the other viſcera. Even in this ſituation, however, a connection takes place between the teſtes and ſcrotum. This is formed by means of a ſubſtance which runs down from the under end of the teſtis to the ſcrotum, forming a kind of pyramidal ſhaped ligament; its large bulbous head being fixed to the lower end of the teſtis and epididymis; and its under extremity, after having paſſed through the ring in the external oblique muſcle, being loſt in the cellular membrane of the ſcrotum. This ligament is evidently vaſcular and fibrous, and ſeems in part to be compoſed of the cremaſter muſcle turned inwards *.

All that portion of the ligament contained within the parietes of the abdomen paſſes *behind the peritonæum*, and receives a covering from it in the ſame manner with the teſtes and other viſcera; and the peritonæum even gives a coat to a portion of the ligament after it has got into the groin, by paſſing down along with it from the abdomen into the upper part of the inguen.

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* See a very accurate account of the Anatomy of theſe parts by Mr J. Hunter, in Dr Hunter's Medical Commentaries.

At this place, viz. at the annular opening of the external oblique muſcle, the peritonæum is very looſe; and when the ligament and ſcrotum are drawn downwards, an aperture is obſerved from the cavity of the abdomen all around the fore part of the ligament, which ſeems ready to receive the teſtis; and this aperture gradually becomes larger as the teſtis deſcends behind the peritonæum in its way to the ſcrotum. When the teſticle is ready to deſcend, it does not fall down, as has been commonly imagined, along the *fore part* of the peritonæum, between it and the other viſcera; but this ligament we have now deſcribed as lying *behind* the peritonæum, and which is connected with the teſtis at its under and poſterior parts, by *directing or pulling it down as it* were *from behind*, brings it in this manner along the pſoas muſcle *between it and the peritonæum;* and that part of this membrane which we have ſhown to be immediately connected with the teſticle being neceſſarily drawn along with it, a kind of pouch or bag, ſomewhat reſembling the finger of a a glove, is thus formed by this elongation of the peritonæum; the under extremity of which ſtill continues to ſurround the teſtis as it goes along, in the ſame manner as it did when that viſcus reſted upon the pſoas muſcle; and the entrance from the abdomen to the cavity of this proceſs, is exactly at that point where the teſtis was originally ſituated; for it is there where this proceſs firſt commences on the teſtis beginning to deſcend.

The peritonæum being in a fœtus remarkably lax and dilatable at this part, and being connected poſteriorly, as we have ſeen, with a quantity of very looſe cellular ſubſtance, its elongation produced by the deſcent of the teſticle is in this manner provided for by nature, and of courſe is eaſily admitted of.

It muſt not, however, be ſuppoſed, that the teſtis and peritonæum in coming down fall looſely and without connexion; for, as they ſlide down very gradually, they ſtill continue to adhere to the parts lying behind them as they did when in the abdomen.

The preciſe time at which the teſtis paſſes down from its original ſituation in the abdomen, cannot be exactly determined; but in general, this change takes place about the eighth month. About this period, the teſtis ſurrounded with the peritoneal proceſs, moves downwards till its under extremity comes into contact with the moſt inferior point of the abdominal parietes; and by this time the paſſage through the tendon of the external oblique muſcle is found a good deal enlarged, by the ligament of the teſtis having ſunk downwards ſo as to produce a conſiderable dilatation of it.

After the teſtis has paſſed the tendon of the muſcle, it commonly remains for ſome time by the ſide of the penis, and by degrees only deſcends to the bottom of the ſcrotum; and even when it has got entirely into the ſcrotum its ligament is ſtill connected with it, and lies immediately under it, but is ſhortened and compreſſed.

The proceſs of the peritonæum, which we have ſhown to deſcend with the teſticle, continues to cover it when it has reached the ſcrotum; and it is this looſe covering or bag which is afterwards converted into what Anatomiſts term the *Tunica Vaginalis Teſtis;* and from the deſcription we have given of it, it is evident, that the cavity of this bag muſt at firſt communicate with the great peritoneal cavity of the abdomen. This it accordingly does, as a probe may be paſſed readily and eaſily along this proceſs or bag, from the belly down to the bottom of the ſcrotum; and if it be laid open through its whole length on the fore part, it will be plainly ſeen to be a continuation of the peritonæum; the teſtis and epididymis will be found at the lower part of it without their looſe coat the tunica vaginalis; and as the ſpermatic veſſels and vas deferens, while the teſticle remained in the abdomen, entered the body of it behind, and between the reflected lamina of the peritonæum, ſo here when in the ſcrotum they will be found covered by the poſterior part of the bag, in their whole courſe from the commencement of that proceſs down the groin to the teſticle.

This paſſage from the cavity of the abdomen to the ſcrotum is in general very ſoon cut off, by a firm adheſion being produced between the ſides of the peritoneal proceſs at its upper extremity where it deſcends from the abdomen. What the cauſe of this adheſion may be, is uncertain; perhaps it may proceed from ſome ſlight degree of inflammation being excited upon the contiguous parts by the forcible paſſage of the teſtis; but whatever the cauſe may be, the fact is, that at the time of birth this paſſage in general is completely obliterated *.

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* The deſcent of the teſtes from the abdomen is a phenomenon very difficult to account for, and its immediate cauſe may probably always remain a myſtery; but their being in almoſt every inſtance found in the ſcrotum *before birth*, is a clear proof of their not being forced down by the effects of reſpiration, as has been commonly ſuppoſed.

It is in the neck only, however, or ſuperior part of this proceſs, that ſuch an adheſion takes place; as the lower extremity of the ſac remains open and looſe through life, and forms, as we have already ſaid, the *tunica vaginalis teſtis;* the common ſeat of a hydrocele.

If the ſmalleſt attention be given to this deſcription, it muſt appear evident, that if immediately upon the teſticle deſcending from the abdomen, and before the paſſage is ſufficiently contracted, any portion of the alimentary canal or omentum ſhould likewiſe fall into the opening, that ſuch parts muſt for certain lodge in the ſame bag or covering with the teſtis itſelf; and that ſo long as they remain there, they muſt effectually prevent the uſual obliteration of the paſſage from being accompliſhed.

It is this occurrence, of a portion of ſome of the abdominal viſcera getting into the tunica vaginalis teſtis, which forms that ſpecies of hernia to which new-born infants are liable, termed by Haller the

Hernia Congenita. The teſticle and protruded inteſtine being here in contact with one another, the tunica vaginalis teſtis forms the hernial ſac.

If the gut, or other parts which have fallen down, be again puſhed into the abdomen, and are retained there by proper bandages or any other means, in that caſe the paſſage is ſoon cloſed up, and no return of the diſorder is obſerved. But this being neglected, and the gut being allowed to remain long down, the parts forming the paſſage ſeem thereby in a great meaſure to loſe that power of adheſion which naturally they are known to poſſeſs; inſtances of ſuch caſes having occurred where no art has been able to produce this wiſhed-for obliteration of the opening.

The hernia congenita is uſually produced in the manner now deſcribed; it is probable, however, that the ſame diſorder may, and frequently does, occur, from this paſſage between the abdomen and teſticle, after having been once cloſed, being again rendered pervious, in conſequence of the parts being over-ſtretched by thoſe violent fits of coughing, crying, and other convulſive affections to which children ſoon after birth are now and then liable. The inteſtinal canal and other viſcera, being on ſuch occaſions puſhed with violence againſt all the containing parts, theſe will moſt eaſily give way where the leaſt degree of firmneſs occurs; and this we may readily ſuppoſe will moſt probably happen in ſuch parts as have been moſt recently united. In this manner it is probable that the greateſt proportion of thoſe caſes of hernia are produced which occur in the early months of infancy; and I am even inclined to think, that on ſome occaſions in more advanced periods of life, the ſame ſpecies of hernia may likewiſe occur from the ſame cauſe.

It is evident, then, in what manner the hernia congenita is produced; we ſhall now inquire into the cauſes which tend to the production of hernia in its more uſual form.

I. The containing parts of the abdomen

we know to be elaſtic and compreſſible; whatever, therefore, tends to produce a diminution of capacity in the cavity of the abdomen, muſt occaſion a proportional degree of riſk, of ſome of the contained parts being puſhed from their natural ſituations. Violent coughing, crying, laughter, or great bodily exertion, are attended with more or leſs contraction of the abdominal muſcles, and particularly of the diaphragm; and as the contraction of theſe muſcles, muſt always diminiſh the abdominal cavity, theſe cauſes therefore are frequently found to be productive of hernia.

II. Falls, in conſequence of the derangement they produce in the abdominal viſcera, from the ſudden and violent ſhock with which they are often attended, are not unfrequently the immediate cauſes of hernia.

III. Perſons of a preternatural laxity of frame, are very liable to herniæ. The containing parts of the abdomen, from the want of a ſufficient tone and firmneſs, are unable in ſuch people to reſiſt on all occaſions the weight of the different viſcera; and they are therefore more particularly expoſed to diſorders of this kind on the ſlighteſt application of any of the cauſes already mentioned.

IV. Sprains are apt to induce a laxity of the part injured; and have therefore a ſimilar influence in inducing herniæ, with general laxity.

V. It has been obſerved, that the people of thoſe countries where oil is much uſed as an article of diet, are particularly liable to herniæ.

In whatever parts the parietes of the abdomen happen to be weakeſt, theſe various cauſes will moſt readily operate in producing herniæ; and accordingly we find, that deſcents of the bowels uſually occur only in ſuch parts.

The parts which from anatomy we would *à priori* ſuſpect to be moſt liable to ſuch protruſions, are, the openings as were already deſcribed in the external oblique muſcles; the arch formed by Poupart's ligament for the paſſage of the great blood-veſſels of the thigh; and the umbilicus, where the ſame degree of firmneſs does not take place as is met with in the reſt of the tendinous expanſion of the abdominal muſcles.

Theſe, as we have already ſaid, are the uſual ſeats of hernia; but it ſometimes happens that parts of the viſcera are protruded between the interſtices of the different muſcles of the abdomen: Theſe, however, are not frequent occurrences.

In whichever of theſe ſituations a protruſion of any portion of the inteſtines occurs, except in the caſe of the hernia congenita, as all the viſcera are contained in the manner already deſcribed within the peritonæum, a portion of that membrane, it is evident, muſt be carried down together with the parts protruded; and in every ſuch inſtance, it is this portion of the peritonæum which goes down along with the gut that is termed the Hernial Sac. The ſize of this ſac is various in different ſubjects, and in different ſtages of the ſame diſorder.

On the firſt appearance of the diſeaſe, the ſac is commonly of no very conſiderable ſize, as ſuch ſwellings ſeldom acquire any great bulk at once: But by repeated deſcents of the bowels, the ſac comes to be puſhed lower and lower, till in ſome inſtances its bulk becomes very conſiderable indeed; and when in this advanced period of the diſorder the ſac happens to be laid open, it is found to contain either large quantities of omentum or inteſtine, and frequently large portions of each.

As the peritonæum has this property in common with many other parts of the body, of thickening according to the degree of any gradual extenſion applied to it, ſo in many inſtances the thickneſs and firmneſs of the hernial ſac are often really aſtoniſhing.

Although every inſtance of a bowel protruded from its natural ſituation is to be conſidered as a derangement, and as ſuch ought to excite our attention for its reduction, yet daily inſtances occur, both of recent herniæ, and of thoſe of longer ſtanding,

ing, in which no bad ſymptoms are produced from ſuch protruſions of the viſcera. Thus it is well known, that hernial ſwellings of every kind very frequently happen, without the patient ſuffering in any other manner, than from the inconvenience ariſing from the bulk of the tumors. But in general this is otherwiſe; troubleſome ſymptoms moſt frequently occur; and at all events, when the reduction of a hernia can be accompliſhed with any kind of propriety, it ought always to be effected as quickly as poſſible.

All the bad ſymptoms which are found to occur in herniæ, proceed, as may be readily ſuppoſed, either from obſtruction to the paſſage of the fæces when the inteſtinal canal forms the tumor, or from a ſtoppage of circulation occaſioned by ſtricture on the prolapſed parts; ſo that the attending ſymptoms, it is evident, will be always more or leſs hazardous, according to the nature of the parts ſo protruded.

Thus, when omentum alone forms the

ſubſtance of hernial ſwellings, as that organ does not appear to be ſo immediately neceſſary for life as many of the other viſcera, ſuch tumors accordingly are not ſo frequently productive of bad conſequences, at leaſt they are ſeldom in any degree ſo hazardous, as when a part of the alimentary canal is either protruded by itſelf, or along with omentum.

Although this, however, is in general the caſe; yet it does ſometimes happen, that even an omental rupture is productive of no ſmall degree of danger. When a ſtricture ſo complete upon it occurs, as to occaſion a ſtoppage of circulation in the protruded part, mortification with all its bad conſequences muſt be the certain event: And beſides, the connection between the omentum, ſtomach, and other viſcera, is ſuch, that a ſudden deſcent of any conſiderable portion of the former ſometimes brings on vomiting, hickup, and other troubleſome ſymptoms: And laſtly, although a rupture containing omentum only, might not of itſelf produce any thing bad; yet as the paſſage through which the omentum has ſlipped, muſt of neceſſity continue open ſo long as that viſcus remains protruded, and as that circumſtance alone muſt ſo long as it continues render it more eaſy for a portion of gut likewiſe to get down, this of itſelf is a ſufficient reaſon for even this ſpecies of hernia deſerving the ſerious attention of practitioners.

But whatever the contents of ſuch ſwellings may be, as their remaining in ſome inſtances for a conſiderable length of time without being productive of any bad ſymptoms, muſt proceed entirely from the circulation continuing to go freely on, notwithſtanding the derangement of parts; ſo, whenever a ſtricture occurs upon the protruded viſcera, ſufficient to produce either a ſtoppage of the circulation, or of the fæcal contents of the alimentary canal when a portion of gut forms the diſdiſeaſe, the following in general are the ſymptoms which accrue.

An elaſtic colourleſs ſwelling is obſerved at the part affected; a ſlight pain is felt not only in the ſwelling itſelf, but, if part of the alimentary canal is down, an univerſal uneaſineſs is perceived over the whole abdomen; and this pain is always rendered worſe by coughing, ſneezing, or any violent exertion. The patient complains of nauſea; frequent reaching; can get no diſcharge by ſtool; becomes hot and reſtleſs; and the pulſe is commonly found quick and hard.

If the ſwelling is entirely formed by a portion of gut, if no fæces are contained in it, it has a ſmooth, equal ſurface; and is eaſily compreſſible, but inſtantly returns to its former ſize on the preſſure being removed. But, in gut ruptures of long ſtanding, where hard fæces have collected in the protruded bowels, conſiderable inequalities are detected.

When again the tumor is compoſed both of gut and omentum, its appearance is always unequal, it feels ſoft and ſomewhat like dough, and of courſe is not ſo elaſtic as when part of the inteſtinal tube only is down; for although like the other it is compreſſible, it does not ſo readily regain its former dimenſions on the preſſure being taken off.

It has been a received opinion, that in caſes of ſtrangulated hernia, the ſymptoms ſhould be leſs violent when the inteſtine is accompanied by a portion of omentum, than when gut alone is down. Little or no difference, however, is produced by this circumſtance; for when a gut becomes obſtructed and inflamed, the ſymptoms thereby induced are nearly the ſame whether the omentum be down with it or not.

It will be readily ſuppoſed, however, that the ſymptoms we have deſcribed never can happen from the preſence of omentum *only*: For although ſtricture produced on a portion of omentum, even when no part of the inteſtinal tube is down, does now and then occaſion a good deal of diſtreſs, ſuch as pain in the part, ſickneſs, vomiting, and twitching pains through the whole belly; yet no obſtruction of the gut ever occurs from this, and of courſe none of the ſymptoms ever prove ſo alarming as when any part of the gut is affected.

If theſe ſymptoms we have deſcribed as being produced by a ſtrangulated gut, are not now obviated by a removal of the ſtricture which produced them, the nauſea and reaching terminate in frequent vomitings, firſt of a bilious, and afterwards of a more fetid matter; the belly becomes tenſe; the pain turns more violent; a diſtreſſing convulſive hickup comes on; and the fever, which before was not apparently of much conſequence, now becomes very formidable, and a total want of reſt with a very diſagreeable ſtate of anxiety continues through the whole courſe of the complaint.

Theſe ſymptoms having gone on with violence for ſome time, the patient is at laſt commonly ſuddenly relieved from all manner of pain, when he flatters himſelf every riſk is for certain over. But inſtead of that, the pulſe, from having beeen hard and frequent, becomes languid and interrupted; cold ſweats break out over the whole body, but eſpecially on the extremities; the eyes acquire a kind of languor; the tenſeneſs of the abdomen ſubſides, and the ſwelling of the part affected diſappears; the teguments covering the parts, which before were either of a natural appearance, or had ſomewhat of a reddiſh inflamed caſt, now acquire a livid hue, and a windy crepitous feel is diſtinguiſhable all over the courſe of the ſwelling.

If the protruded parts have not of themſelves gone entirely up, their return is now in general eaſily effected by a ſmall degree of preſſure, and the patient then diſcharges freely by ſtool; but the cold ſweats increaſing, the hickup turns more violent, and death itſelf is at laſt uſhered in by its uſual fore-runners, ſubſultus tendinum and other convulſive twitchings.

Theſe are the ordinary ſymptoms of what is termed a ſtrangulated or incarcerated gut hernia; that is, when the parts protruded become ſo affected by ſtricture, as to produce pain; and do not either return to their natural ſituations on the patient getting into a horizontal poſture, or cannot even be immediately replaced by the hands of a practitioner.

In whatever ſituation a ſtrangulated hernia occurs, the only rational method of cure, it is evident, muſt conſiſt in the removal of that ſtricture which prevents the return of the protruded parts. It is that ſtricture which ought to be conſidered as the cauſe of all the miſchief; and unleſs it be removed, nothing effectual can be done for the relief of the patient.

Various methods have been attempted by practitioners for the removal of ſtricture in theſe diſorders; all of them, however, may be comprehended under two general heads.

I. Such as effect a reduction of the protruded parts, without the interpoſition of inciſion or any chirurgical operation properly ſo called; and,

II. A diviſion of the parts producing the ſtricture, ſo as to admit of a replacement of the deranged viſcera, conſtituting what is termed the Operation for the Hernia.

The remedies to be employed for accomcompliſhing the firſt of theſe, are, a proper poſture of the patient, with the manual aſſiſtance of a practitioner; blood-letting; ſtimulating glyſters; opiates; the warm bath; and proper applications to the tumor itſelf.

So ſoon as the aſſiſtance of a practitioner is deſired for the removal of ſymptoms in caſes of hernia, the firſt circumſtance requiring his attention, is, the placing his patient in ſuch a poſture as will moſt probably favour the return of the protruded parts. Thus, when the tumor is in the groin, or in the fore part of the thigh, the patient ought to be ſo placed, as to raiſe his thigh and legs conſiderably higher than his head and trunk; that is, he ſhould be placed almoſt perpendicularly upon his head.

This poſition cauſes almoſt the whole quantity of inteſtines to hang or ſwing by the protruded parts, which frequently proves a means of effecting their reduction. Placing the patient's feet over the ſhoulders of another perſon, while at the ſame time

his

his body is allowed to hang downwards, and cauſing him in this poſture to be a good deal jolted about, has on ſome occaſions been known to anſwer when every other means has been tried in vain.

For the ſame reaſon that in the inguinal and femoral hernia the poſition now mentioned is more adviſable than any other, the ~~ufual~~ erect poſture of the body becomes moſt proper in caſes of *exomphalus* or *umbilical rupture;* and again, a horizontal poſture is moſt likely to prove ſerviceable in caſes of *ventral hernia.*

While the patient thus remains in the moſt ſuitable poſture according to the ſeat of the diſorder, the ſurgeon ſhould at the ſame time endeavour to aſſiſt the return of the gut or other parts, by means of gentle preſſure with his hands and fingers. In the inguinal or ſcrotal hernia, this preſſure ſhould be made obliquely upwards towards the os ileum, ſo as to correſpond as nearly as poſſible with the opening in the external oblique muſcle. In the femoral hernia, the preſſure ought to be made directly upwards; in the umbilical hernia, downwards and backwards; and in the ventral hernia, directly backwards.

When tumors of this nature are of any conſiderable ſize, preſſure, as we have here recommended, is moſt conveniently made, by graſping the ſwelling with one hand from the bottom upwards, while with the fingers of the other hand we endeavour to puſh forward the parts at the ſuperior part of the tumor. Some ſurgeons, in puſhing forward the inteſtine, employ the fingers of *both hands* at the upper part of the tumor; but the ſame purpoſe is anſwered equally well with the index and middle finger of one hand, while the other hand is employed to great advantage in preſſing the under part of the tumor upwards ſo as to co-operate in this manner in the reduction of the parts. It is this operation which by authors is termed the *taxis*. No deſcription, however, can convey an adequate idea of the manner of performing it properly; for, like many other circumſtances in the art of ſurgery, it can only be obtained by repeated experience and attentive obſervation: But this muſt always be had in view, that any preſſure that is applied, muſt be of the moſt gentle kind; for every thing of this nature that creates much pain, is very prejudicial, and ought by all means to be avoided.

If a very moderate degree of preſſure applied in the manner deſcribed, does not effect a reduction of the tumor, other means muſt be immediately employed. *Blood-letting* is here a principal remedy. In no diſorder is it either more indicated from appearances, or affords more relief in reality. The quantity to be taken away ought in a great meaſure to be determined by the ſtrength of the patient: But if in any caſe we can with propriety venture upon abſtracting large quantities of blood from weakly people, it is here; and it is often aſtoniſhing to what length this evacuation is carried in caſes of hernia without being productive of any prejudice to the ſyſtem. A ſtate of deliquium being known to produce a more effectual relaxation of the various muſcular parts of the body, than can be obtained by any other means, it has ſometimes been adviſed in caſes of hernia, to take off ſuch large quantities of blood, and in ſuch a ſudden manner, as to produce fainting; and the practice has now and then been attended with advantage.

As an obſtinate coſtiveneſs is commonly one of the moſt alarming ſymptoms of hernia, it has been a common practice to preſcribe not only a variety of ſtimulating purgatives by the mouth, but injections compoſed of the moſt acrid materials. From all the experience, however, which I have had in diſorders of this nature, I am convinced that purgatives are very ſeldom productive of much good; and when they do not prove uſeful, they almoſt univerſally do miſchief, by increaſing not only the ſickneſs at ſtomach which always prevails here, but even by adding to the pain and tenſion of the tumor. I am clear, therefore, that remedies of this kind ſhould not be puſhed ſo far as they commonly are; and when they are applied, inſtead of purga-

tives

Plate VI.

Fig. 4.

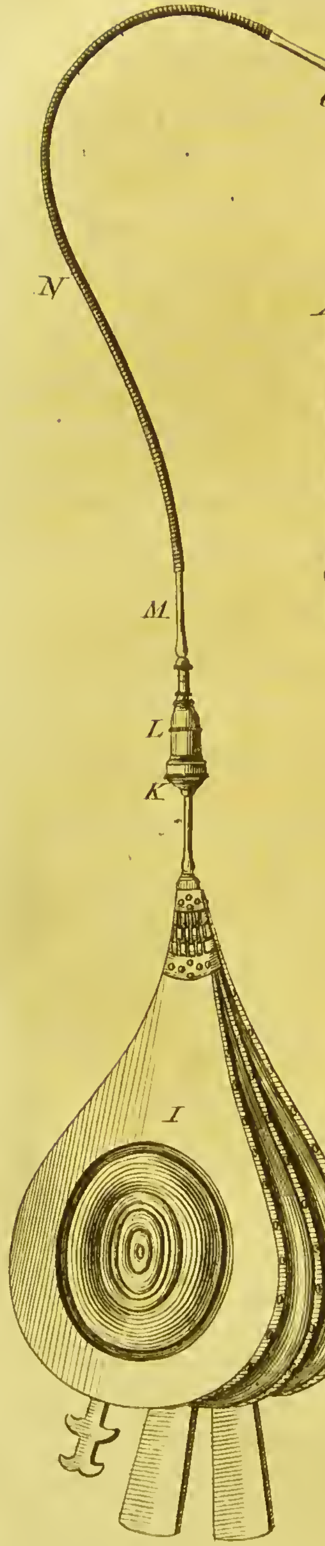


Fig. 1.

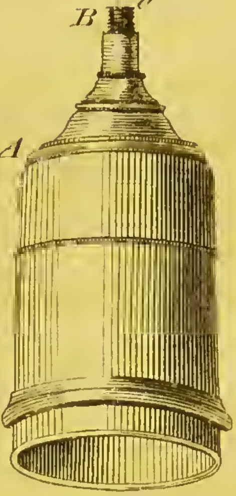


Fig. 2.

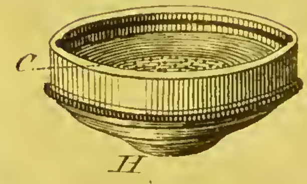
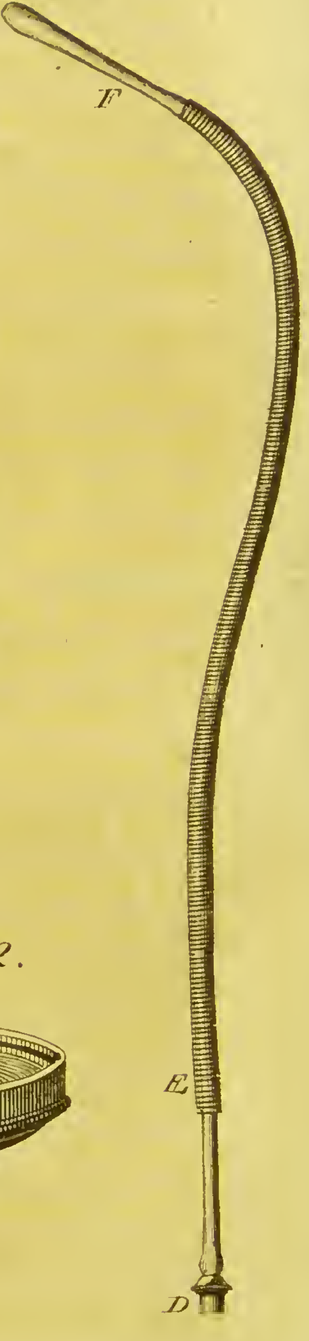


Fig. 3.



A. Bell sculp.t

tives by the mouth, which always prove very nauſeating, and in this ſtate are uſually rejected by the ſtomach, I would recommend Tobacco ſmoke thrown up in the form of injections, as preferable to every other remedy. A variety of machines have been contrived for injecting ſmoke by the anus; but none of them I have met with anſwer the purpoſe either ſo eaſily or ſo effectually as the inſtruments repreſented in Plates VI. and VII. They are eaſily procured; and by means of either of them, ſmoke may be injected with any neceſſary degree of force.

I would not have it ſuppoſed, however, that I recommend tobacco ſmoke uſed in this manner as an *infallible* purgative, as has been done by many. For the contrary is certainly the caſe; I have known it uſed in a great number of caſes both of hernia and ileus, and ſeldom with any advantage. I only adviſe it as the moſt effectual remedy of this kind with which I am acquainted, and I know that the method here recommended of injecting it, is the moſt effectual hitherto invented. It has been objected to theſe inſtruments we have delineated, that we cannot when they are employed have any certainty of the quantity of ſmoke injected. But this is a nicety of little importance; as the rule in all ſuch caſes ſhould be, to continue to throw up the ſmoke either till it has produced the wiſhed for effect, till a conſiderable degree of ſickneſs is induced, or till the abdomen is found to be ſomewhat diſtended by it, as in ſome patients a third or even a half more may be neceſſary for this purpoſe than is found to anſwer in others.

But although this remedy does not frequently anſwer as a purgative, it often, both in caſes of hernia and ileus, proves a very effectual anodyne. And as we are frequently in ſuch caſes deprived of the advantage of opium, by its being rejected by the ſtomach, in ſuch inſtances, when the pain is very ſevere, it may be always employed as one of the beſt means of procuring eaſe.

With the ſame view as the remedy laſt men-

Plate VII.

Fig. 2

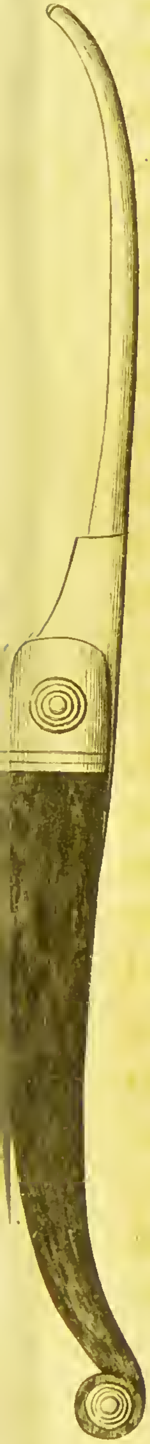


Fig. 1.

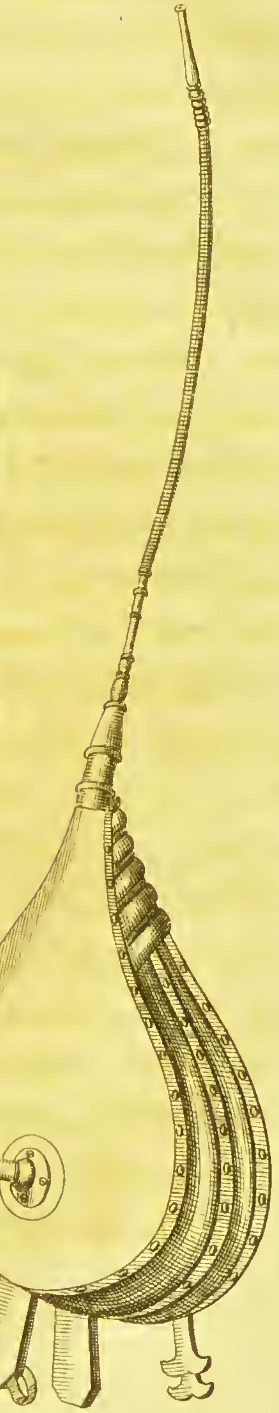
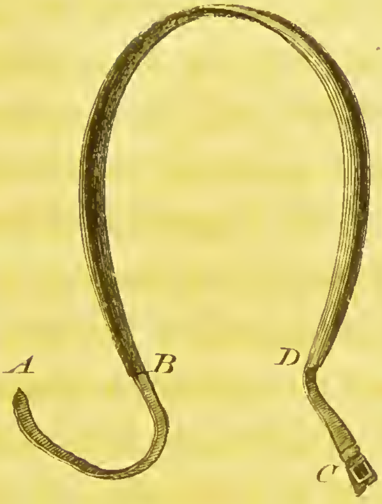


Fig. 3.



A Bell Sculpt.

mentioned, acrid ſuppoſitories, compoſed of ſoap, aloes, and other ſtimulating materials, have been recommended; and when remedies of this claſs are to be uſed, theſe may be conſidered as a neceſſary addition to the other purgatives; but no great dependence ought ever to be placed upon them.

I know, we are told that in ſome caſes of hernia, the uſe of draſtic purgatives has been of advantage; but I have ſo frequently known them do harm, by increaſing the nauſea, pain, and inflammation of the ſtrangulated gut, that I am under no difficulty in ſaying that they ought ſeldom, if ever, to be uſed in any caſe of hernia.

Opiates are here often of ſervice, not only by relieving pain, but as tending to relax thoſe parts which, by being preternaturally conſtricted, we conſider as the principal cauſe of the diſorder. We have already obſerved, however, that the conſtant retching which occurs in moſt caſes of hernia, prevents the exhibition of opiates by the mouth; but in ſuch inſtances they may be applied with ſome ad-

advantage in the form of injection, and their uſe may be alternated with that of tobacco ſmoke as we have lately adviſed.

Warm bathing is another remedy from which much advantage has been received in diſorders of this nature. It is not the local application of heat, however, in the form of poultices and fomentations, &c. we mean to recommend, but the univerſal warm bath, in which the whole body is immerſed, and which we know to be poſſeſſed of very relaxing powers.

The latter, viz. the general warm bath, by tending to relax the conſtriction on the protruded inteſtines, has frequently had a conſiderable influence in promoting their replacement; but the former, viz. poultices, and other means of applying local heat to the ſwelled parts, although commonly employed, are undoubtedly very prejudicial. On the conſtricted tendon they can have no influence, for it always lies ſo deep as to be out of the reach of every local application of this nature: And as the heat conveyed by ſuch remedies, muſt for certain tend to rarefy the contents of ſuch ſwellings, by their thus producing an increaſe of ſize in the tumors to which they are applied, inſtead of anſwering any good purpoſe, on this principle it is evident they muſt do harm; and accordingly, whoever will attentively obſerve their effects, will find this to be the caſe. When the external teguments are much inflamed and painful, by their emollient properties they now and then afford ſome relief; but the eaſe ſo obtained is only momentary, as the pain commonly ſoon becomes more violent than before they were employed.

Whoever attentively conſiders the nature of theſe diſorders, and the means generally found moſt effectual in relieving them, will probably coincide with us, in imputing the bad ſymptoms which occur in caſes of hernia, to a ſtricture induced upon the protruded parts. By many, however, a contrary opinion has been inculcated; and the principal cauſe of the various ſymptoms which occur here, has been ſuppoſed to be, inflammation, or ſome ſpaſmodic affection of the protruded parts, independent of any ſtricture of the parts through which theſe have paſſed.

That inflammation of the prolapſed bowels, whatever may originally have produced it, will in general terminate in all the ſymptoms of ſtrangulated hernia, no perſon will deny; but that ſtricture of the ſurrounding tendons is by much the moſt frequent cauſe of them, we think is ſo very obvious, as to render it quite unneceſſary here to adduce any arguments in ſupport of the opinion: This, however, we muſt remark, that even on the ſuppoſition of the origin of all the miſchief lying in the protruded parts themſelves, and not in any ſtricture of thoſe through which they paſs, ſtill the impropriety of warm applications muſt be equally obvious, as by the rarefaction they induce, they muſt always tend to produce an additional degree of ſwelling in the contents of the hernial tumor.

Independent, however, of any theoretical reaſoning, I can with certainty aver, that in practice, much more advantage is obtained in diſorders of this kind, from cooling applications, than from thoſe of an oppoſite nature. In different inſtances I have ventured on the application of ice and ſnow, ſometimes with evident advantage, and I never ſaw them do harm[*]. But in general, the remedies I depend moſt on here, are, cold ſaturnine ſolutions, and cloths kept conſtantly moiſt with a mixture of cold water and vinegar.

By a proper application of one or other of the remedies now mentioned, or by a due combination of all of them, many caſes of hernia are relieved without any farther aſſiſtance: But it frequently happens, notwithſtanding every endeavour, that the protruded parts cannot be returned; the ſymptoms, inſtead of abating, become more violent; and the event of the diſeaſe is of courſe rendered more doubtful.

In this ſituation, when no probability remains of ſucceſs from the employment of the means already mentioned, the diviſion of the parts producing the ſtricture is then our only reſource.

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[*] By ſome writers, this practice has been conſidered as hazardous; but I find it recommended by others to whom much credit is due, particularly by the late Dr Monro. See his Works, 4to edition, p. 559.

This, it may be remarked, is one of the niceſt points in practice that a ſurgeon has ever to determine upon: I mean the exact period at which, in caſes of hernia, the more gentle means ſhould be laid aſide, and the operation be put in practice. If a ſurgeon, without having given a full trial to all the uſual remedies, ſhould early in the diſorder proceed to the operation, and if unfortunately it ſhould not ſucceed, he would probably be blamed by the friends of the patient as the principal cauſe of his death; and again, even allowing a recovery to be obtained, he is apt to be blamed, not only by his brethren of the profeſſion, but by the patient himſelf for having made him ſuffer an unneceſſary degree of pain.

In ſuch a ſituation, a practitioner often finds himſelf much embarraſſed. But we ought to be directed here, as in every critical caſe we are employed in, by the reſult of experience only; and if this rule is adhered to, inſtead of tedious delays uſual in every caſe of ſtrangulated hernia, we will have recourſe to the operation much earlier than is uſually done.

This operation, as is the caſe indeed with every other of equal importance, is no doubt attended with ſome hazard; but the danger accruing from it has by moſt practitioners been more magnified than it ought to be: For although no perſon of character can in any caſe of hernia be ſuppoſed to have recourſe to it before other means have been tried; yet, ſo far as from experience I am able to judge, the riſk attending the diſorder itſelf when the operation is long delayed, is infinitely greater, than is commonly experienced from the effects of the operation conſidered abſtractedly.

Were we able from the attending ſymptoms to determine the exact period at which the operation ought to be performed, no kind of difficulty would occur from it; but this is ſo far from being the caſe, that the moſt experienced practitioner cannot with any certainty decide upon it. In ſome inſtances, herniæ with every ſymptom of ſtrangulation, continue for ſix, eight, or ten days; and after all, the protruded parts are at length replaced, and the patient does well; and in many ſimilar caſes when the operation has been the means of relief, although the very worſt ſymptoms have ſubſiſted for ſeveral days, yet on laying the parts open, no appearances either of inflammation or gangrene have been detected.

On other occaſions, again, the ſame ſet of ſymptoms, with perhaps no greater degree of ſwelling or tenſion in the parts affected, end fatally in a very ſhort ſpace of time. In ſome ſuch inſtances, the rapid progreſs of the diſorder is very ſurpriſing; the ſpace of eight-and-forty hours hardly intervening, from its firſt attack till the patient's death: I have even known the inteſtines become perfectly gangrenous in the courſe of one day from the time of their firſt expulſion.

Every practitioner muſt be ſenſible, that this is the real ſtate of the queſtion; and if it is ſo, it muſt at once become evident, that conſiderable delays muſt in ſuch critical circumſtances be always attended with great hazard; and as the real danger to be apprehended from the operation itſelf, is trifling when compared to the riſk which long delays uſually produce, it ought therefore, I think, to be laid down as an eſtabliſhed maxim in this part of practice, Always to proceed to the operation, if in the ſpace of a very few hours blood-letting and the other remedies pointed out, do not prove effectual. Two or three hours at fartheſt, even when the aſſiſtance of practitioners is early applied for, is perhaps the greateſt length of time that ſhould ever be occupied with trials of this nature.

In the treatment of herniæ, it is certain, that French ſurgeons are uſually more ſucceſsful, than the generality either of German or Britiſh practitioners; and ſo far as I know, no reaſon can be aſſigned for the difference, but that the French in almoſt every inſtance proceed more early to the operation than the ſurgeons of almoſt any other nation. They will thereby, no doubt, perform it frequently on patients who might have recovered by more gentle means; but any inconvenience ariſing from this circumſtance to a few, is fully compenſated by the number of lives which muſt be ſaved by having recourſe to the operation in due time, and which in all probability would otherwiſe have been loſt.

Although for very obvious reaſons the reduction of every caſe of hernia ought to be attempted when that can be done with propriety, yet it frequently happens that particular circumſtances occur which effectually debar every reſource of this nature.

When once a hernial ſwelling has been properly reduced, it is in general in the patient's power to prevent any return in future, by keeping a proper bandage conſtantly applied to the opening from whence the parts were protruded. But it often happens from inattention to this circumſtance, that ruptures which might at firſt have been eaſily cured, come at laſt by repeated deſcents, and by the great quantity of parts that fall down, to form tumors of ſo great a magnitude, in proportion to the opening through which they were protruded, that no art can replace them by the more ſimple means of reduction.

Independent, too, of the great degree of bulk to which tumors of this kind ſometimes arrive, ſuch adheſions frequently take place, between the viſcera forming the ſwelling and the ſurrounding parts, as render their return altogether impracticable by any other means than by the operation. By this laſt mode, indeed, almoſt every caſe of hernia may be reduced; but however neceſſary this operation may be when a patient's life is in danger, as it is always attended with ſome degree of riſk, it ought never to be put in practice where ſymptoms of ſtrangulation do not actually exiſt.

In that chronic ſtate of hernia we have been juſt deſcribing, although by intereſted and ignorant practitioners the operation has been often propoſed as a radical cure, yet no ſurgeon of character would in ſuch circumſtances ever think of adviſing it: He would reſt ſatisfied with preventing any accumulation of fæces in the inteſtines, by preſcribing a proper diet and the occaſional uſe of gentle laxatives; and with obviating any inconvenience which might ariſe from the weight of the tumor, by the application of a proper ſuſpenſory bandage.

By theſe means alone, large tumors of this kind are often rendered very ſupportable for a great length of time; the circulation of the parts contained in the ſwelling goes freely and regularly on, as well as the periſtaltic motion of ſuch parts of the alimentary canal as have been protruded; and hence it is that we have many inſtances of large portions of the gut falling down even to the bottom of the ſcrotum, and continuing there for a great number of years without producing any interruption whatever to the uſual diſcharge by ſtool.

In this ſituation, therefore, of the diſeaſe, the operation can never become admiſſible.

But although people labouring under this ſtate of the complaint, do frequently enjoy very good health, and ſometimes feel little or no inconvenience from the ſwelling, yet it muſt not be ſuppoſed that their ſituation is altogether free from danger: On the contrary, it is very certain, that on many occaſions, ſwellings of this kind which have ſubſiſted for a great length of time without being productive of much trouble, do at laſt inflame and turn painful, ſo as to produce every bad ſymptom commonly obſerved from the real ſtrangulation of a gut. So long, too, as a ſwelling of this nature remains, as the opening through which the parts have been protruded is thereby effectually prevented from cloſing, ſo the patient is always liable to deſcents of other portions of inteſtine which have not formerly been down, and which may be productive of the moſt fatal ſymptoms. But what we here wiſh to eſtabliſh is, that till once theſe bad ſymptoms do actually occur, either from an affection of that part of the gut which has been long down, or of a portion more recently protruded, no ſuch operation as the one in queſtion ought to be employed. All that can be done with propriety in ſuch caſes, is, to fit the patients with proper ſuſpenſory bandages; to warn them of the riſk they are conſtantly liable to; and to caution them againſt violent exerciſe, particularly leaping, and every ſudden exertion.

Although with regular practitioners this circumſtance cannot require much diſcuſſion, yet the public at large is much intereſted in it. The former know well, that the operation ſhould not be performed in any caſe of hernia where violent ſymptoms do not render it neceſſary; but the latter, by not being able to judge of the various circumſtances which ought to be taken into conſideration, are too frequently impoſed upon by that numerous ſet of Itinerants with which every country abounds. By theſe, a variety of operations are put in practice for performing what they call a *radical cure* of theſe diſorders; by which they mean to ſay, a prevention of future deſcents.

But as no remedy with which we are acquainted, a well adapted truſs only excepted, can be depended on for this purpoſe; and as all the other means put in practice for it, are not only painful, but in general are productive of much danger; the magiſtracy of every community ought to interfere in ſuppreſſing them.

The object in view by every attempt of this nature, is, either to effectuate the entire deſtruction of the hernial ſac, or at leaſt to procure an accretion of its ſides; which, by ſuch as are ignorant of the anatomy of the parts concerned, has been conſidered as equal to the effect of preventing any returns of the diſorder in future; and for the production of which, various methods have been invented.

In order to effect a total deſtruction of the ſac, our forefathers employed not only the knife, but the potential and even actual cauteries; and with a view to produce a firm union of its ſides, which was conſidered as equally effectual, it was afterwards propoſed by practitioners of more tender feelings, to employ the needle and ligature, or what was termed the Royal Stitch; and for the ſame purpoſe was invented the famous *punctum aureum*, which was performed in the following manner. After reducing the inteſtines into the abdomen, the ſac was laid bare with a ſcalpel; and a piece of gold-wire being paſſed round it at its upper end, the wire being likewiſe made to include the ſpermatic cord, it was then ordered to be twiſted with a pair of forceps to ſuch a degree of tightneſs as to prevent the deſcent of the gut, but not to interrupt the circulation in the ſpermatic cord *.

But none of theſe methods being found to anſwer, for even the actual cautery, when carried perhaps to the depth of the bone itſelf, did not inſure the patient againſt a return of the diſorder, our modern pretenders have therefore ventured to improve upon the ignorance of ancient practitioners, and actually go the length of deſtroying not only the hernial ſac, but even the teſtis alſo: without any knowledge of the anatomy of the parts, and having no characters to ſuffer from whatever conſequences may enſue, they proceed without fear; and, by promiſing all that patients can hope for, they are ſure to be every where well received. In conſequence of this, in every large town, many operations are performed by them; numbers accordingly are for certain mutilated, and many thereby even loſe their lives. Their method of proceeding is ſhortly this: They lay bare the hernial ſac, and having reduced the prolapſed parts, a ſtrong ligature is paſſed round both the ſac and ſpermatic cord, and is drawn ſo tight as to deſtroy effectually, not only the paſſage along the ſac, but the cord itſelf, and of courſe the teſticle. On ſome occaſions matters go no farther; but on others, ſuch a degree of inflammation has been induced, as to terminate in the patient's deſtruction.

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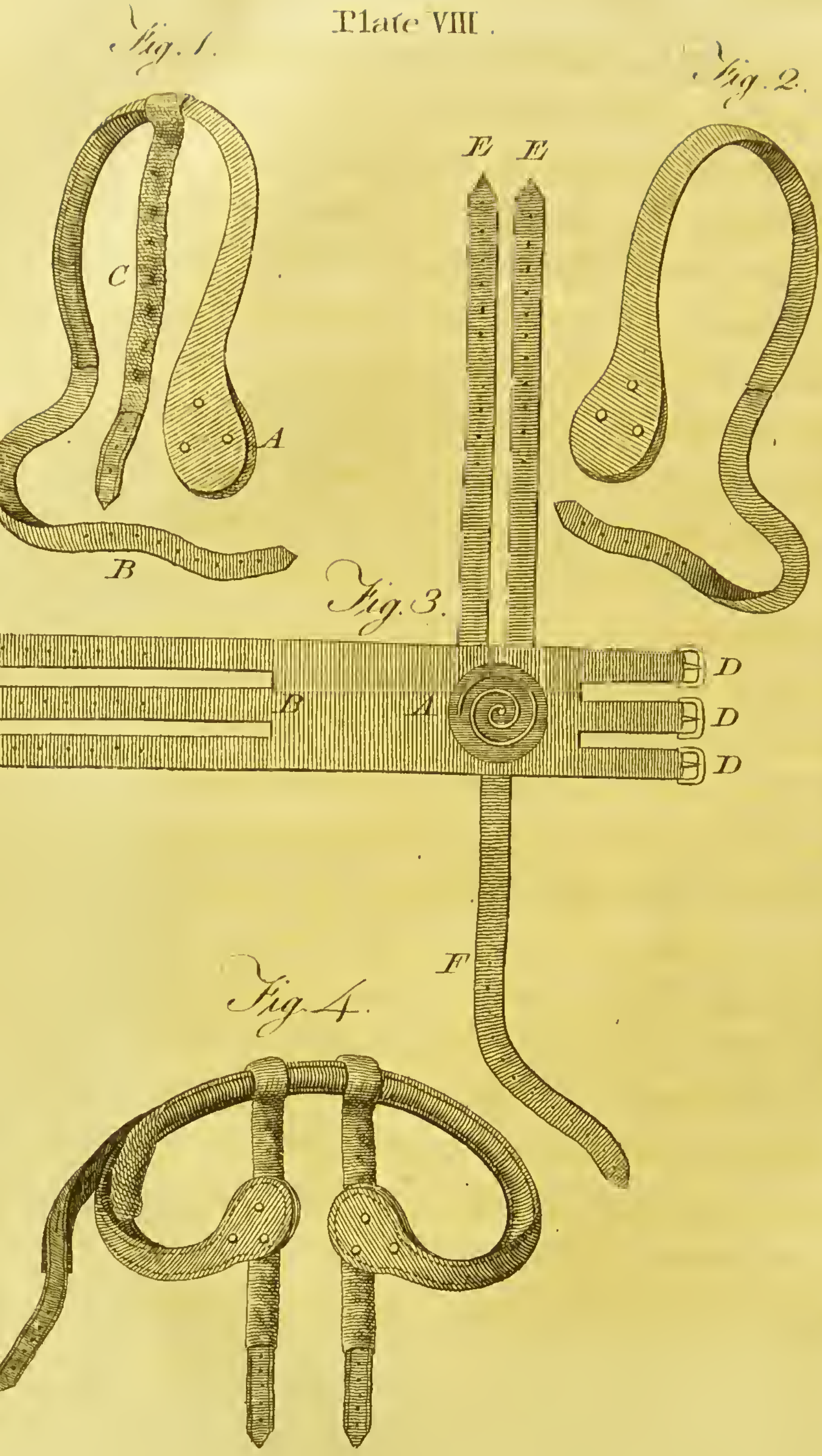
* For a more particular account of theſe various modes of practice in the different kinds of hernia as employed in former times, ſee the writings of Albucaſis, Paulus Ægineta, Fab. ab Aquapendente, Hildanus, Parey, &c.

If any of theſe means, however, was to be productive of the effect propoſed, viz. the prevention of every future deſcent of inteſtine, the riſk incurred would be in ſome meaſure compenſated by the advantage received: But the fact is much otherwiſe; for unleſs a truſs be kept conſtantly applied, the patient continues liable to a return of the diſorder in nearly the ſame degree as if no operation had been performed. Even the operation for the hernia itſelf, does not, as has been ſuppoſed, fortify the parts againſt a return of the diſorder, the continued uſe of a truſs being juſt as neceſſary after that operation as if it had not taken place.

I have dwelt longer on this circumſtance than may be thought neceſſary by thoſe who are much converſant in this part of practice; but as it is certain, that even of late years much miſchief has been done by Itinerants, in the various ſpecies of hernia, and as they ſtill continue to impoſe upon the

Plate VIII.



A Bell Sculpt.

the public, I thought it neceſſary to put the unwary on their guard againſt the effects of their knavery and ignorance.

In Plate VIII. are repreſented a variety of truſſes for different ſpecies of hernia. Thoſe here delineated are intended for the more uſual kinds of hernia, viz. the inguinal, crural, and umbilical. When others are wanted for particular parts, the moſt ingenious tradeſman in that line of buſineſs ſhould be applied to, with directions to fit the inſtrument with the niceſt exactneſs to the parts it is intended for. Indeed, the good effects of every bandage for this complaint, depends ſo much upon the exactneſs with which it is made to fit, that, without the utmoſt nicety in this reſpect, it muſt always do more harm than good; for, the ſole purpoſe of a bandage in caſes of hernia, is, to prevent effectually the falling down of ſuch parts as have been newly replaced: If therefore the pad or bolſter of the bandage does not bear properly againſt the opening upon which it is placed, a portion of gut may ſlip out, and be thus materially injured by the preſſure of the pad. I have met with different inſtances of this kind, where bandages by not being exactly fitted did much miſchief, and every practitioner muſt have obſerved them; it is therefore a matter of the firſt importance, that tradeſmen be ordered to pay very great attention to this circumſtance. Every bandage uſed for this purpoſe ought to be of the ſteel-ſpring kind; for thoſe compoſed of linen and other ſoft materials, can never be kept properly applied. Even in infancy, the ſteel bandages, when properly made, are in general uſed with eaſe and ſafety: But at any rate, when they cannot be got to apply exactly, which in early childhood is ſometimes the caſe, no dependence ought to be placed upon any other; for they always fret and gall the parts to which they are applied, and I never knew them in any one inſtance to anſwer the purpoſe.

Having premiſed theſe general obſervations, which relate equally to every variety of the diſorder, and by which frequent repetitions will be rendered unneceſſary, we ſhall now proceed to the more particular conſideration of the different ſpecies of hernia; and firſt of the Bubonocele.

SECTION II.

Of the Bubonocele.

TOGETHER with the general ſymptoms of ſtrangulated hernia which we have lately enumerated, and to which we muſt here refer, the particular appearances of the bubonocele, or inguinal hernia, are, a ſoft ſomewhat elaſtic ſwelling, beginning in the groin, and deſcending by degrees into the ſcrotum in men, and into the labia pudendi in women. When a portion of gut forms the tumor, it commonly feels tenſe, and this always in proportion to the degree of ſtricture that occurs in the opening of the tendon; and when any inflammation takes place, the leaſt degree of handling or preſſure always gives pain.

When the hernia contains omentum only, the ſwelling is both more ſoft, compreſſible,

preſſible, and more unequal, than when gut alone is down; the ſcrotum becomes more oblong, and of courſe leſs round, than in an inteſtinal hernia; and when the quantity of omentum is large, it is alſo much more weighty than a gut rupture of the ſame ſize: But in many caſes, perhaps in the greateſt proportion of all hernial ſwellings, the tumor is compoſed of both gut and omentum; and then the diſtinguiſhing ſymptoms of each can never be ſo clearly marked. In books, various ſymptoms are enumerated, for diſtinguiſhing the contents of every ſpecies of hernia; but whenever the caſe is in any degree complicated, every candid practitioner muſt acknowledge, that no certainty as to this point can be obtained till the tumor is fairly laid open.

As there are ſome diſorders with which the inguinal and ſcrotal hernia may be confounded, practitioners ought to be as much acquainted with their characteriſtic marks as poſſible. Theſe complaints are, glandular or other ſwellings in the groin, whether from the venereal diſeaſe or any other cauſe; that ſpecies of ſwelling termed Hernia Humoralis; and all the different kinds of hydrocele.

The venereal bubo and other ſwellings in the groin, are readily diſtinguiſhed from hernia, not only by the abſence of all the general ſymptoms of hernia, but by that incompreſſible hardneſs which all ſuch ſwellings are at firſt attended with, and by the fluctuation of matter which in their ſuppurated ſtate always prevails.

In the hernia humoralis, or ſwelling of the teſticle, the hardened and enlarged ſtate of the teſticle itſelf, as well as of the epididymis; their being exquiſitely painful to the touch; the tumor being remarkably heavy in proportion to its bulk; and the ſpermatic proceſs being commonly very free from ſwelling; are in general pretty certain means of diſtinction. In hernia humoralis, too, the inteſtines are free and unobſtructed, and the other general ſymptoms of hernia as formerly pointed out are wanting.

In the hydrocele of the tunica vaginalis teſtis, the tumor in general is more equal to the feel than in hernia: in the former, the ſwelling always begins in the under part of the ſcrotum, and proceeds upwards; whereas the very reverſe occurs in herniæ. Except in caſes of very enlarged hydrocele, the ſpermatic proceſs is always perfectly free and diſtinct; whereas in every caſe of hernia where the tumor deſcends to the ſcrotum, the ſpermatic cord cannot in any part of its courſe be diſtinguiſhed. In a hydrocele, a fluctuation of a fluid is diſtinguiſhable; in hernia it is otherwiſe.

From the anaſarcous ſwelling of the ſcrotum, or hydrocele of the dartos as it is termed, hernia is very readily diſtinguiſhed; and indeed the means of diſtinction are ſo obvious, that they need not be here enumerated: but there is another ſpecies of hydrocele, *viz.* the hydrocele of the ſpermatic cord, which on ſome occaſions it is no eaſy matter to diſtinguiſh from hernia, and which therefore requires particular attention.

The ſpecies of hydrocele, where the

water is collected in one or more cells of the ſpermatic proceſs, now and then begins in the under part of the cord, and proceeds upwards; and in ſuch caſes, this circumſtance alone is a ſufficient means of diſtinction between it and hernia, in which the ſwelling always proceeds from above downwards; but it ſometimes happens, that the ſwelling in this kind of hydrocele begins even within the opening in the abdominal muſcle, and by degrees falls downwards. In ſuch inſtances, it is altogether impoſſible from the ſtate of the tumor merely, to ſay whether it is the one diſeaſe or the other. The general ſymptoms of hernia, ſuch as pain and tenſion of the abdomen, obſtructed inteſtines, &c. muſt be particularly attended to; and as theſe do not occur in any ſpecies of hydrocele, when they happen to take place they will commonly convey a great degree of certainty reſpecting the real nature of the diſeaſe. In ſome caſes, however, theſe and every other means of diſtinction are wanting; but even in ſuch circumſtances a prudent practitioner will never run any riſk, either of hurting his patient, or of affecting his own reputation; which the miſtaking a Hernia for a Hydrocele, and treating it as ſuch, muſt always do; and which, to the diſgrace of Surgery, has on ſome occaſions actually happened.

In all ſuch caſes, where any degree of doubt occurs, as well as in *every caſe* of tumor in the teſticle where the moſt perfect certainty is not obtained, and when it is neceſſary to have recourſe to an operation, the ſurgeon ought to proceed as if the diſorder was a real hernia: By doing ſo, every riſk will be avoided; and on the tumor being laid cautiouſly open, the true nature of the diſeaſe will be then rendered evident, and the practitioner accordingly will be at liberty to apply the means beſt ſuited for its removal. Whereas by adopting a contrary method, and by treating as a Hydrocele what afterwards turns out to be a true Hernia; independent of any injury to his own reputation, he runs a very great riſk of deſtroying his patient.

In the treatment of Bubonocele, when the various means already recommended when treating of hernia in general are employed without ſucceſs, the ſurgeon is then under the neceſſity of proceeding to the operation, and the method of doing it is this.

A table of a convenient height being placed in a proper light, the patient muſt be laid upon it with his head and body almoſt horizontal, whilſt at the ſame time his buttocks are ſomewhat elevated by means of pillows. The legs hanging over the edge of the table, ought to be ſeparated ſo as to admit the operator between them; and ſhould in that ſituation be firmly ſecured by an aſſiſtant on each ſide, who ſhould take care to keep the thighs ſo far raiſed, as to relax a little all the abdominal muſcles.

In order to afford as much empty ſpace as poſſible for the return of the protruded parts, the patient ſhould be adviſed to empty his bladder entirely; and the parts having been previouſly ſhaved, an inciſion muſt now be made with a common round-edged ſcalpel through the ſkin and part of the cellular ſubſtance, beginning at leaſt an inch above the ſuperior extremity of the tumor, and continuing it down to the moſt depending part of the ſcrotum. Even although the tumor does not extend to the bottom of the ſcrotum, the parts ſhould be laid open in the manner directed: By a free external inciſion the operation is allowed to be finiſhed with more eaſe and freedom than when the firſt opening is not ſo large; it does not produce much more pain than a ſmall inciſion; and by being continued to the bottom of the ſcrotum, the matter produced in the upper part of the ſore is prevented from collecting below, which it is otherwiſe ready to do.

The operator now goes on to divide ſlowly the reſt of the cellular ſubſtance, together with ſome tendinous kind of bands, which, unleſs the diſorder is very recent, are univerſally met with, either looſe upon the ſurface of the hernial ſac, or, on ſome occaſions, paſſing as it were into its ſubſtance. Even this external inciſion of the teguments ought to be made with great caution: For although in by much the greateſt proportion of hernial ſwellings, the ſpermatic veſſels lie behind the protruded parts, yet on ſome occaſions they have been found on the anterior part of the tumor; ſo that in order to avoid the riſk of wounding them, ſo ſoon as the ſkin is divided the remainder of the operation ought to be done in the moſt cautious manner, care being taken to avoid every large blood-veſſel that makes its appearance.

This circumſtance of the prolapſed parts getting down behind the ſpermatic veſſels, has never, ſo far as I know, been taken notice of in books; it muſt therefore be a very rare occurence. As I met with it, however, in one caſe, where the fact was exceedingly evident, the poſſibility of its happening I have therefore no reaſon to doubt. If we attend only to the *uſual* conformation of theſe parts, the hernial ſac, we would ſay, ought never to get behind the ſpermatic cord: But we know well, that in no part of the human body is nature more apt to ſhow ſuch inclination to deſert her ordinary courſe, than in ſome circumſtances relating to the teſticles and their veſſels. We have already obſerved, that till near the period of delivery, the teſticles continue in the abdomen; and about that time, fall down in a gradual manner to the ſcrotum. Many inſtances, however, occur, of both teſtes remaining in the abdomen through life: Sometimes one remains, and the other falls into the ſcrotum. On other occaſions, one or both fall into the groin, and never proceed farther; a circumſtance which every young practitioner ſhould be aware of, as inſtances have occurred of a teſticle remaining in the groin being miſtaken for a hernia, and of much pain and diſtreſs being produced by different attempts made for their reduction. Now, if ſuch varieties as theſe occur in the mechaniſm of theſe parts, why may not nature in ſome inſtances produce ſuch a conformation as may, in the event of a hernial ſac falling into the ſcrotum, bring the ſpermatic cord, and even the teſticle itſelf, into a ſituation anterior to the protruded parts? I ſhall not here enter into the diſcuſſion of the manner in which ſuch a circumſtance may be produced; but, as I am certain that the fact has happened, and as it may therefore occur again, I conſider it as an additional argument for the propriety of dividing the hernial ſac in the cautious manner here directed *.

In making this firſt inciſion of the ſkin, it is uſual to do it by pinching up the teguments, and then dividing them with a ſcalpel; but no ſurgeon of ſteadineſs and dexterity will ever think it neceſſary to proceed in this manner: for this inciſion of the ſkin is done with much more neatneſs,

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* Since this went to the preſs, I find that a ſimilar inſtance is recorded by Le Dran, in his *Treatiſe on Ruptures*, of the ſpermatic veſſels having been found on the anterior part of a bubonocele.—Such a ſituation, therefore, of theſe veſſels, is perhaps more frequent than is commonly imagined.

neſs, and with equal ſafety, by the operator graſping the tumor with his left-hand, in ſuch a manner as to render the teguments on the anterior part of it as tenſe as poſſible, while with the ſcalpel in his right-hand he divides the ſkin from one end of the ſwelling to the other.

The diviſion of the ſkin and cellular ſubſtance being continued in the manner directed till the ſac is laid bare, an opening muſt be made in it ſo as to bring its contents into view; and the moſt ſafe place for ſuch an opening, is, not about the middle of the tumor, as is commonly directed, but as near to its inferior extremity as poſſible: It is here done with as much eaſe as in any other part; and beſides, the gut is ſeldom if ever found juſt at the bottom of the ſac, which is commonly occupied with a quantity of bloody ſerum; ſo that the riſk of wounding it is there much leſs than in any other part of the ſwelling. In making this perforation into the ſac conſiſts the greateſt nicety in the operation, the utmoſt caution being neceſſary to avoid wounding the parts protruded from the abdomen. Good eyes and a ſteady hand are in no operation more requiſite than in this: With theſe, any practitioner acquainted with the anatomy of the parts may be ſure of doing the operation properly, and without them the beſt anatomiſt muſt undoubtedly go wrong.

With the ſame ſcalpel that divided the ſkin and cellular ſubſtance, the operator muſt proceed ſlowly, dividing one fibre of the ſac after another, till there is reaſon to think that the whole ſubſtance of it is cut through. This may be always diſcovered by means of the blunt end of a probe: If that paſſes in eaſily, the ſac is for certain divided; and if it does not, the inciſion muſt be continued in the ſame gradual manner ſomewhat farther, when the ſame trial with the probe muſt be again made.

In proſecuting this diviſion of the ſac, a good deal of aſſiſtance is obtained from the uſe of a ſmall ſharp-pointed directory, open at the extremity, as is repreſented in Plate IX. fig. 3. By puſhing the end of this inſtrument below ſome of the fibres of the ſac, they are thereby ſeparated from the parts underneath, and may be thus cut upon with more ſafety than by any other means; and in the ſame manner the remaining parts of the ſac muſt be divided, till this part of the operation is finiſhed *.

In almoſt every caſe of hernia where the tumor is confined to the groin, and even where the ſwelling extends to the ſcrotum if the parts are recently protruded, the hernial ſac is found very thin, and in ſuch caſes is always ſoon cut through; but it is neceſſary for the information of young practitioners, to obſerve, that in hernial ſwellings of long ſtanding, the ſac frequently becomes ſo very thick, as to require much more diſſection than beginners

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* In the 4th Volume of Memoirs of the Paris Academy of Surgery, there is a very ingenious paper on Herniæ by Monſieur Louis. But although there are many uſeful obſervations communicated in this treatiſe, Mr Louis in one point I think has gone far wrong, in ridiculing that degree of caution ſhown by ſome ſurgeons

ginners commonly expect: By going on, however, in the cautious manner we have directed, every riſk of wounding any material part may be always avoided.

So ſoon as an opening is made quite through the ſac, a circumſtance of which we are made certain, as was already remarked, by a probe paſſing eaſily in, it ought then to be farther enlarged, till it is of

geons in dividing the hernial ſac: The diviſion of the ſac, he ſays, is attended with ſo little difficulty, that he does not conſider it as different in that reſpect from the firſt external inciſion of the ſkin. His words are: "Jamais le ſac ne m'a donné ni plus de peine, ni plus d'embarras que la peau; on diviſe, pour ainſi dire, celle-ci du *premier trait*, et le ſac *du ſecond*." In the hands of ſuch an expert operator as Mr Louis, the ſcalpel even in this manner may be ſo managed as to do no harm; but with the general run of practitioners much miſchief would be produced by proceeding in this part of the operation ſo rapidly as is here directed. And when we reflect that the difference of a few ſeconds in the courſe of the operation, is all that could be gained by the greateſt diſpatch we can employ, little doubt, I think, can remain as to the propriety of proceeding through every part of it in the moſt deliberate manner.

of ſuch a ſize as to receive the fore-finger of the operator's left hand.

The finger being now introduced, is to be uſed as a director for entering the narrow blunt-pointed biſtoury, repreſented in Plate VII. with which the ſurgeon is to divide the hernial ſac along its whole length from below up to the opening in the external oblique muſcle. By means of the finger as a director for the biſtoury, this part of the operation is performed with perfect ſafety; and the biſtoury recommended, renders the many complex inſtruments formerly employed not only for this part of the operation, but for the ſubſequent diviſion of the tendon, quite unneceſſary.

On laying the ſac open at the bottom, a quantity of coloured fluid always ruſhes out, and the protruded parts now come fully into view: If a portion of gut is down, and is not much entangled with omentum, by being now ſet at liberty it puſhes out immediately on the ſac being opened; thereby giving the appearance of having been collected in a larger quantity, than the ſize of the tumor gave reaſon to expect.

The portion of gut found in hernial ſwellings is very various, no part of the inteſtinal canal being entirely exempted from falling down. Hitherto the ileum has been commonly ſuppoſed to form the ſubſtance of the greateſt proportion of ſuch tumors; later and more accurate obſervation, however, renders it probable, that the cæcum, appendix vermiformis, and part of the colon, are more frequently contained in herniary ſacs than any other portion of the gut.

The ſac being laid fully open, the parts contained in it, ought now to be examined with the niceſt attention, in order to diſcover whether they are all ſound or not; and if upon an attentive inſpection they are found to be ſound, that is, if they are not evidently in a gangrenous ſtate, even although they do ſeem to be conſiderably inflamed, every endeavour ſhould be uſed to get them immediately returned into the abdomen.

In making the reduction, whether inteſtine or omentum, or a portion of each, have been found contained in the ſwelling, thoſe parts of them which appear to have come laſt out, ought to be firſt puſhed back; the difficulty and trouble of returning them being thereby much leſſened: And in making the reduction, it both anſwers the purpoſe better, and is leſs likely to do miſchief, applying the fingers to that part of the inteſtine connected with the meſentery than to the convex part of the gut*. While the reduction is going on, the patient's thighs and loins ſhould be ſtill more elevated than they were during the preceding ſteps of the operation; as this poſture of theſe parts tends much to facilitate the return of the protruded inteſtines to the abdomen.

When the diſeaſe is recent, and the parts have not been frequently down, it ſometimes happens, that by pulling out a little more of the gut than was formerly in the ſac, any obſtruction which occurred to its being replaced is thereby removed; and if the protruded parts are not of great bulk they may thus be ſometimes reduced, without any neceſſity for enlarging the opening through which they have paſſed from the abdomen: But when upon trial this cannot be done with great eaſe, it ſhould never be attempted; much more danger being to be dreaded from any degree of force uſed for the reduction of the gut, than can ever occur from finiſhing the operation by an enlargement of the opening in the tendon of the external oblique muſcle.

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* Pott's *Treatiſe on Ruptures.*

As the tendon of this muſcle runs in an oblique direction from above downwards, and as the opening through which in caſes of hernia the parts protrude, is formed merely by a ſeparation of the tendinous fibres from one another, the direction of this opening is of courſe the ſame with that of the tendon; that is, it runs ſomewhat obliquely from the ſpine of the ileum to the os pubis.

In enlarging this paſſage, then, for the reduction of ſuch parts as have paſſed through it, as a tranſverſe ſection of the tendon is by no means neceſſary, the knife ſhould be carried obliquely upwards, ſo as merely to continue the natural ſeparation of the tendinous fibres.

The finger was recommended as the beſt director for the knife in opening the ſac, and in dividing the tendon it is equally neceſſary. By inſinuating the finger into the aperture in the tendon immediately above the protruded parts, the point of the blunt biſtoury is eaſily introduced upon it; and in this manner, by keeping the end of the finger always a little before the biſtoury, the opening may be enlarged to any neceſſary extent without any riſk of wounding the contiguous parts.

In general, a very ſmall enlargement of the natural opening in the tendon is found ſufficient for the reduction of the gut and other parts: But the ſize of the opening ought by all means to be fully ſufficient for the end propoſed; for it is better to exceed in making it ſomewhat too large, than to run any riſk of hurting the parts by forcing them through a very ſmall aperture.

If upon introducing the finger any adheſions of the gut to the contiguous parts are diſcovered, the inciſion in the tendon ought to be larger than might otherwiſe be neceſſary, with a view that the finger may be freely admitted ſo as to deſtroy ſuch adheſions as it can reach; for unleſs they are removed, complete ſucceſs from the operation cannot be expected.

Independent of ſuch adheſions internally, it frequently happens, by long confinement in the ſcrotum, preſſure, and perhaps other cauſes, that ſtrong adheſions are formed among the parts contained in the ſac itſelf; and before they can be with propriety reduced, it is always neceſſary to attempt their removal.

When adheſions of this kind occur, as they ſometimes do, between different parts of the protruded gut, the greateſt caution is neceſſary in ſeparating them: But connections of this nature between one portion of the inteſtinal canal and another, are ſeldom very firm, and are commonly eaſily ſeparated by the fingers alone; and when the connection is formed by means of long filaments, which is ſometimes the caſe, the eaſieſt method of removing them is to cut them, either with a pair of ſciſſars or the biſtoury: But when it ever happens, that one part of a gut adheres ſo firmly to another as not to be ſeparatrd with much eaſe, it is much better to return the whole even in that ſtate into the abdomen, than to run the riſk of hurting the inteſtine materially by uſing much force.

When, again, adheſions occur between the gut and hernial ſac, or between the gut and omentum, if the filaments producing the connection cannot be otherwiſe removed, as there is no great hazard in wounding the omentum, and ſtill leſs in hurting the ſac, a very ſmall portion of theſe may be diſſected off, and returned with the gut into the abdomen; and in the ſame manner, when the omentum adheres ſo firmly to the ſac as not to be ſeparated in any other manner, no danger can ever accrue from the ſac being ſomewhat encroached upon.

The riſk and trouble attending the practice now recommended is nothing, at leaſt it is very trifling, when compared to the inconveniences that would enſue from leaving either the omentum or gut adhering externally to the hernial ſac, as is adviſed by ſome writers when ſuch adheſions cannot be very eaſily divided. The ſmalleſt portion of gut being left down, would run a great riſk of ſuffering by expoſure to an unuſual degree of cold, and to the effects of the external air at the different dreſſings; and by leaving part of the omentum to protrude through the opening from the abdomen, one great advantage to be expected from the operation would be loſt, viz. the prevention in future of that riſk which a patient with a portion of protruded omentum is always liable to, of a piece of gut ſlipping down, and perhaps of becoming ſtrangulated.

After returning the contents of the ſac into the cavity of the abdomen, it has been propoſed by ſome authors, to paſs a ligature round the upper part of the ſac juſt at its neck, with a view, as we are told, of procuring a reunion of its ſides, in order that it may ſerve as a means of preventing future deſcents of the bowels.

But as ſuch a ligature cannot be applied without much riſk of injuring, or even of deſtroying the ſpermatic veſſels, with which the poſterior lamella of the ſac is immediately connected, the practice from that conſideration alone ought to be entirely laid aſide; but in reality it does not appear to be in any degree neceſſary, as this very union of the ſides of the ſac is univerſally produced merely by that degree of inflammation which always ſucceeds to the diviſion of it by this operation.

Hitherto we have recommended the immediate reduction of the contents of hernial tumors upon the ſuppoſition that they have been only diſplaced, that they have been adhering to one another or to the neighbouring parts, or perhaps that they have been more or leſs in a ſtate of inflammation. But when on examination it appears that this inflammation has already terminated in gangrene, as the return of ſuch mortified parts, whether of omentum or inteſtine, might be exceedingly hazardous, a greater degree of caution becomes neceſſary.

When the omentum is found in a mortified ſtate, as the exciſion of a portion of this membrane is not attended with much riſk, it has been the common practice to cut away the diſeaſed parts; and in order to obviate any inconvenience from the hæmorrhagy which might enſue, we are adviſed to make a ligature on the ſound previous to the removal of the mortified parts; whilſt the ends of the ligature being left hanging out of the wound, the ſurgeon has it in his power to remove them when circumſtances appear to render it proper.

Theſe ligatures on the omentum, however, having frequently been productive of bad conſequences, ſuch as nauſea, vomiting, cough, fever, pains in the belly, and inability to ſit erect; and it having been found by the experience of many individuals, that no hæmorrhagy of any importance ever occurs from a diviſion of this membrane even in a ſound unmortified ſtate; ſuch parts as have become gangrenous may therefore be freely cut off, and the remaining ſound parts be afterwards without the intervention of ligatures introduced into the abdomen with no riſk whatever. This is now the opinion of different practitioners*: But if it ſhould ever happen, on cutting off part of the omentum, that a veſſel of any ſize is divided, a ligature may with great ſafety be paſſed about the veſſel itſelf, without including any of the membrane; and the ends of it being left long enough to hang out at the wound, the threads may be afterwards pulled away at pleaſure.

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* A very accurate paper upon this ſubject may be ſeen in the 3d Vol. of Memoires de l'Acadmie Royalle de Chirurgie of Paris, by Monſieur Pipelet, in which ſeveral caſes are related of the bad effects produced by ligatures on the omentum.

Mr Pott is alſo of this opinion.—Vide Treatiſe on Ruptures.

Another circumſtance ſometimes occurs, too, which renders the removal of part of the omentum neceſſary; when a rupture has been of long duration, and a conſiderable portion of caul has remained long down, from the preſſure made by the uſual ſuſpenſory bandage and other circumſtances, it frequently happens that conſiderable quantities of the protruded parts become much thickened, very hard, and collected into lumps. When theſe lumps are not very large, there is no neceſſity for removing them, as they may be always, when ſmall, returned into the abdomen without producing any inconvenience; but whenever it appears to the operator, that by their bulk and hardneſs they might probably do miſchief if reduced into the belly, they ought as certainly to be cut off as if in a ſtate of real mortification.

When it is determined to remove any prrt of the omentum, the eaſieſt and ſafeſt method of doing it is this. The membrane ought to be carefully expanded at the part intended to be cut, and in this ſtate it is very eaſily divided by a pair of thin-edged ſciſſars; much more ſo, indeed, than by any other inſtrument. When fully ſpread out, any turn of inteſtine that happens to be enveloped in it, is at once brought into view, which without this precaution we would run a great riſk of dividing by the ſciſſars.

When, again, a portion of gut is found to be mortified, if it ſhould be returned in that ſtate, a diſcharge of fæces would certainly take place into the cavity of the abdomen, ſo ſoon as the mortified ſpot ſhould ſeparate from the ſound. In order to prevent ſuch an occurrence, which would ſoon terminate in the patient's death, if it is a ſmall ſpot only that is diſeaſed, we ought to endeavour by means of a needle and ligature, to connect the ſound part of the gut immediately above the mortified ſpot, to the wound in the abdominal parietes. By this means, when the mortified part ſeparates, or on its being immediately cut out, which is perhaps better, the fæces are diſcharged by the wound; and different inſtances have occurred, where the loſs of ſubſtance produced by the mortification was not extenſive, of the opening into the gut becoming gradually leſs, and at laſt healing entirely: But whether the event ſhould prove ſo fortunate or not, whenever a portion of gut is obſerved to be completely mortified, it ought by all means to be ſecured by a ligature to the parts moſt contiguous to the wound.

And farther, when the mortified portion of gut is of great extent, and includes, ſo far as it goes, the whole circumference of the inteſtine, the gangrenous parts of it ought to be cut out at once; and if the quantity thus taken away is not ſo conſiderable as to prevent the ends of the gut from being brought into contact with one another, it ought to be immediately effected in the manner we ſhall direct in another chapter when treating of Gaſtroraphy. This at leaſt affords a chance of the ends of the gut being brought to reunite, and if unfortunately that event ſhould not take place, as the gut ought here alſo to be connected to the parts contiguous to the wound in the abdomen, a paſſage for the fæces is ſtill ſecured by the groin.

Although in caſes of hernia, attended with a mortification of the inteſtines, many have recovered by the method recommended who otherwiſe muſt have died; yet it will be readily ſuppoſed, that the riſk attending patients in ſuch a ſtate muſt be very great: But although a ſmall proportion only of ſuch as are unfortunately in this ſituation ſhould recover, yet ſtill no practitioner would be excuſable for omitting thoſe means which afford the greateſt probable chance of a recovery. A patient of my own is now living, and in good health, voiding his fæces by the anus, who loſt at leaſt one foot of the inteſtinal canal by mortification in a caſe of crural hernia; and we are told by different authors, of ſimilar recoveries equally remarkable.

It is to the moderns chiefly, we muſt remark,

mark, that this very material improvement in the treatment of hernia is to be attributed. It is even recorded of Rau, who lived in a very late period, that on opening a hernial ſac, where a gangrenous ſtate of parts was detected, as the caſe was conſidered as deſperate, he laid down his knife and proceeded no farther in the operation. This patient, who died next day, would in modern practice have had at leaſt ſome chance for life.

When in this operation, therefore, it is diſcovered, that part of the contents of the ſac are mortified, all ſuch portions as are to be removed ought to be cut off; and the remaining ſound inteſtine being detained till properly ſecured by a ligature, the opening in the external oblique muſcle may then be dilated with ſafety: Whereas, if it ſhould be enlarged before the diſeaſed part of the gut is taken away, the gangrenous portion might very probably ſlip up together with the ſound; but by the precaution now recommended, every riſk of this nature is prevented.

The parts forming a hernia being all completely replaced, when the ſac in which they were contained is found thick, hard, and much enlarged, as in ſuch a ſtate no good ſuppuration can take place, and as its preſervation cannot be in any degree uſeful, ſuch parts of it as can be cut away with propriety ought to be removed: All the lateral and fore-parts of the ſac may be cut off with ſafety; but as it is commonly firmly connected with the ſpermatic veſſels behind, nothing there ought to be attempted.

The operation being now finiſhed, by the protruded parts being replaced, and thoſe intended to be removed being cut off in the manner directed, the remaining ſore muſt be dreſſed as lightly as poſſible with charpee of the ſofteſt kind; and the beſt bandage for retaining the dreſſings, is the uſual ſuſpenſory bag properly ſtuffed with ſoft lint.

The patient on being carried to bed ſhould be ſo placed as to have his loins ſomewhat elevated above the reſt of his body, and ſhould in that ſituation be immediately laid to reſt: Opiates are here particularly uſeful: To prevent, or at leaſt to moderate, the fever which commonly ſucceeds, the patient ſhould be kept cool; in plethoric habits, blood-letting ſhould be preſcribed, together with a rigid low diet; and laſtly, a frequent uſe of gentle laxatives, ſo as to keep the belly moderately open, is particularly proper.

When however the conſtitution has been previouſly much reduced, either by long ſickneſs or any other cauſe, inſtead of blood-letting and a low diet, a nouriſhing regimen ſhould be preſcribed; for if a patient in ſuch circumſtances is not properly ſupported, he will not ſo readily recover from the effects of the diſorder: And it is proper to remark, that, in ordinary practice, the indiſcriminate uſe of blood-letting, and an abſtemious regimen, in every caſe of hernia, appears to be too rigidly adhered to; for although this practice proves always more effectual than any other means in every caſe of rupture attended with inflammation, yet daily experience convinces us of its being highly pernicious where the ſyſtem has been already much reduced by evacuations, and where no inflammatory ſymptoms take place.

The ſore being regularly dreſſed as often as it appears neceſſary, in the ſame eaſy manner as at firſt, and the ſame degree of caution being continued both with reſpect to diet and other circumſtances, if the patient ſurvives the firſt three or four days he will in general recover: And ſo ſoon as the ſore is firmly cicatriſed, a truſs ought to be properly fitted to the parts, and ſhould never in any future period of life be laid aſide.

By many it has been recommended, and is ſtill a very common practice, to ſtitch up the wound with two or three ſutures; but as no real advantage can be obtained from this, and as it has been on ſome occaſions productive of miſchief, it ought never to be attempted. No perſon will probably ſay, that ſuch ligatures ought to be carried ſo deep as the tendon of the oblique muſcle; and if they are only made to paſs through the external teguments, they can have no effect in preventing a protruſion of inteſtines:

tines: On the contrary, it does now and then happen, during the cure of the wound after this operation, that ſmall portions of gut paſs out at the opening in the tendon, which when the external parts have not been drawn together are always readily ſeen and eaſily reduced; but on the ſkin being by ligatures made to cover the greateſt part of the wound, I have known it more than once happen, that portions of inteſtine have paſſed out at the opening in the tendon, and remain protruded for a conſiderable time without being noticed; ſo that the practice ought to be entirely exploded.

After having laid the ſac bare in this operation, it was ſome time ago recommended by Mr Petit and other French practitioners, to endeavour to reduce the protruded inteſtine without dividing the ſac. One great advantage expected from this was, the prevention of ſuch bad conſequences as are moſt likely to enſue from the acceſs of the external air to the contents of the abdomen.

It ought to be remembered, however, that unleſs the hernial ſac is laid open, we cannot poſſibly know in what ſtate the protruded bowels are; ſo that parts might be returned into the abdomen in ſuch a ſtate of diſeaſe as would add greatly to the patient's riſk. Not only the inteſtines are liable to mortification, but collections are apt to occur in the hernial ſac, of a very fetid putrid ſerum, which, on being puſhed into the abdomen, might be productive of much miſchief. And beſides, it has ſometimes happened, that, on laying open a hernial ſac, the cauſe of ſtrangulation has been detected, either in the entrance to the ſac itſelf, or among the parts protruded along with it: For although, in a great majority of all the inſtances of hernia that occur, a ſtricture of the paſſage in the external oblique muſcle is to be conſidered as the cauſe of all the bad ſymptoms, yet now and then inſtances of the contrary are obſerved; one of which I met with ſome years ago, and I have heard of others of the ſame kind.—In a caſe of ſcrotal hernia of long ſtanding, ſymptoms of ſtrangulation at laſt ſupervened; and on laying open the ſac, the appendix vermiformis was found ſo tightly twiſted round a portion of gut, as left no reaſon to doubt of that circumſtance alone having been the cauſe of all the miſchief. If the parts had here been returned into the abdomen without dividing the ſac, no advantage whatever would have occurred from the operation; and, after death, the practitioner would have had the mortification to find, that, in all probability, the patient's life might have been ſaved, had this very neceſſary meaſure not been omitted.

Inſtances of the protruded parts in caſes of hernia being returned into the abdomen without opening the ſac, are enumerated by different French authors; and in ſome of theſe which ended fatally, it was found on diſſection, that ſtrangulation of the gut had been occaſioned by ſtricture formed by the parts contained within the ſac, and not by the tendon of the external oblique muſcles.

Diſaſters of a nature ſimilar to theſe we have mentioned, having on different occaſions occurred to Mr Petit and others who had adopted the practice of returning the parts contained in the ſac without dividing the ſac itſelf, it has now accordingly been very generally laid aſide. Even Mr Petit himſelf was at laſt ſo convinced of the inconveniences reſulting from it, that he is ſaid to have joined keenly with thoſe who had oppoſed it from the time of its being firſt introduced.

By ſome authors again, it is adviſed, to reduce not only the protruded bowels, but even the hernial ſac itſelf, without opening it; whilſt by others, it is alleged, that the ſac can never be reduced. Mr Louis in the paper already quoted, is clearly of this laſt opinion, as Mr Pott alſo is. But we have the teſtimony of different authors of credit, and particularly of Mr Le Dran, to the contrary; and I have myſelf met with one inſtance of this kind, where the appearances were ſo unequivocal as to leave no doubt with me reſpecting this point.

In caſes of hernia where the parts have been long and repeatedly down, ſuch firm adheſions are uſually formed between the ſac and contiguous parts, as to reduce them apparently into one inſeparable maſs; ſo that, in ſuch circumſtances, reduction of the ſac becomes altogether impracticable. But although this is perhaps in every inſtance found to be the caſe in ruptures of *long* continuance, we are by no means warranted in ſuppoſing that it is ſo in every caſe of *recent* hernia. We know that the adheſion of one part of the body to another, cannot any where be inſtantaneouſly produced. Even where recent diviſion has taken place, and when the divided parts are kept in cloſe contact, the ſpace of ſeveral days is required to effect a firm reunion. Now in the caſe of a portion of membrane being forced into a natural opening, where the parts are neither rendered raw by art, nor are as yet affected with inflammation, a ſtill longer period we may ſuppoſe will be neceſſary for this effect; and in fact, although I ſuppoſe there is ſcarce an inſtance of a hernial ſac of long duration being reduced, yet there are ſundry undiſputable facts which ſhow, that in recent ruptures the ſac may be returned. The one above alluded to, which occurred in an operation at which I was preſent ſeveral years ago, had been down five or ſix days, and formed a tumor in the groin of the ſize of an egg: The ſac did not in any point ſeem to adhere; the operator therefore found no difficulty in reducing it; and on diſſection after death, which happened in two days or ſo from the operation, the paſſage through the external oblique muſcle was found dilated, but no exiſtence of a ſac could be traced into it. It is not, however, my own opinion, that this is a matter of much importance in practice, I mean the practicability of reducing the hernial ſac or not; for, the various reaſons we have already given, againſt the propriety of returning the contents of a ſac without opening it, occur with equal force againſt the propoſed practice of returning the ſac itſelf unopened. But as there is a poſſibility of future experience deriving ſome advantage from this circumſtance, it is certainly right to have the fact as clearly eſtabliſhed as poſſible.

Hitherto we have been ſuppoſing the diſorder to exiſt in a male ſubject only; but as the ſame openings in the external oblique muſcle are met with in females, ſo they are liable to the ſpecies of rupture we have juſt been deſcribing.

In males, however, the bubonocele is obſerved to occur more frequently than in women, and as in them too the cellular membrane ſurrounding the ſpermatic veſſels is very lax and dilatable, ſo hernial ſwellings of this kind are commonly much larger in men than in women. But inſtances do now and then occur of ſuch tumors even in women becoming very large; in ſuch caſes, the protruded parts fall down to the very bottom almoſt of the labia pudendi.

As the openings in the external oblique muſcles of females are exceedingly ſimilar to thoſe in male ſubjects, ſo the treatment of this ſpecies of hernia is in them very ſimilar to what is found to anſwer in men. In caſes of ſtrangulated gut, when glyſters, blood-letting, and the other remedies formerly enumerated, happen to fail, the ſame operation of laying open the hernial ſac, and of enlarging the opening in the tendon of the oblique muſcle, is here equally proper as in the other ſex.

With modeſt women, diſorders of this kind often take place without the practitioner in attendance being made acquainted with it; whenever in them therefore ſuch ſymptoms of colic occur as give reaſon to ſuſpect the exiſtence of hernia, a particular examination ought always to be made, in order if poſſible to detect the cauſe of the miſchief, from the removal of which a cure can alone be expected.

SECTION III.

Of the Hernia Congenita.

BY attending to the anatomical deſcription in the firſt ſection, of the parts chiefly concerned in caſes of hernia, it muſt evidently appear, that in the *ordinary* ſpecies of ſcrotal hernia, the parts protruded from the abdomen muſt of neceſſity be contained in a bag or ſac perfectly diſtinct from the teſticle; which in that kind of rupture is always found in its uſual ſituation in the ſcrotum, ſurrounded by its own proper membrane the tunica vaginalis, and not in contact with any other part whatever.

We then made it appear too, that if in early infancy a portion of gut ſhould ſlip down by the ſame paſſage with the teſticle, that the parts ſo protruded muſt be in immediate contact with the teſtis, and muſt thus be ſurrounded with the tunica vaginalis; ſo that in this ſpecies of rupture, very properly by Haller termed Hernia Congenita, the tunica vaginalis teſtis forms the hernial ſac.

The diſcovery of this ſpecies of hernia, which was reſerved for modern times, enables us to account for a number of caſes recorded in books of ſurgery, of the contents of ruptures having been found in the ſame bag with the teſticle: A circumſtance which till this diſcovery, was always conſidered as a clear proof of the peritonæum being frequently ruptured in thoſe diſorders; as there was not otherwiſe a poſſibility

bility of accounting for the phenomenon. But we now know, that the peritonæum in theſe caſes of hernia is never ruptured; and that the parts forming a hernial tumor being found in contact with the teſticle, is a circumſtance eaſily explained from our more accurate anatomical knowledge of thoſe parts.

In the treatment of ruptures of the congenital kind, little difference occurs from the management of the bubonocele in its more ordinary form. When the parts can be replaced without any operation, it ought always to be done, a truſs being at the ſame time recommended as a preventative of future deſcents; and when ſymptoms of ſtrangulation take place, which cannot be otherwiſe removed than by the operation, it here becomes equally neceſſary as in any other ſpecies of rupture.

When from the circumſtance of the parts having been protruded in early infancy, and from their having at times continued to fall into the ſcrotum from that period downwards, there is reaſon to ſuſpect that a hernia to be operated upon is of the congenital kind, the ſurgeon in ſuch a caſe, in laying open the contents of the tumor, muſt proceed with ſtill more caution than in caſes of ordinary rupture; for the tunica vaginalis which here forms the ſac, is commonly much thinner than the uſual ſac of herniæ. On the parts being returned, more attention is neceſſary too in dreſſing the wound than in other caſes of hernia; for the teſticle being here laid bare by its vaginal coat being cut open, if it is not treated with much delicacy it will very probably inflame, and may thereby be productive of much diſtreſs. The teſtis therefore ought to be immediately enveloped with its own proper covering, the looſe tunica vaginalis; and at every dreſſing, care ſhould be taken to prevent as effectually as poſſible every acceſs to the external air.

In other reſpects the management of hernia congenita is perfectly ſimilar to that of any other rupture.

SECTION IV.

Of the Crural or Femoral Hernia.

THE ſeat of this ſpecies of hernia, as we have elſewhere remarked, is on the upper and anterior part of the thigh; the protruded parts paſſing out at the ſame opening through which the large blood-veſſels of the thigh are tranſmitted from the abdomen.

In the deſcription given in a former ſection, of the external oblique muſcles of the abdomen, the under edge of theſe muſcles, it was remarked, by doubling backwards, forms a kind of ligament, which extends in an oblique direction from the ſpine of the ileum near to the ſymphiſis pubis. It is this under border of theſe muſcles which is commonly known by the name of Poupart's or Fallopius's ligament.

Excepting at its two extremities where this ligament is attached to the pubes and ileum, it is not in any other part connected with bone. By the particular ſhape of the ileum at this part, a kind of arch is formed by the ligament paſſing over a hollow in that bone through which the large artery and veins of the thigh find a paſſage, the reſt of the cavity being filled up with cellular ſubſtance, glands, and fat; and all theſe parts again are covered and tied down by a firm tendinous aponeuroſis of the faſcia lata of the thigh.

It is under the tendon or ligament juſt now deſcribed, that the parts compoſing a crural hernia deſcend. On ſome occaſions they paſs immediately over the femoral artery and vein; on others, they are found on the outſide of theſe veſſels; but more frequently they lie on the inſide, between them and the os pubis.

As the protruſion of any of the abdominal contents produces in this ſituation nearly the ſame ſet of ſymptoms as occur in caſes of inguinal hernia, the method of treatment recommended in that ſpecies of the diſeaſe is alſo applicable here.

When, therefore, in the femoral hernia, ſymptoms of ſtrangulation occur, we muſt put all the remedies in practice already adviſed for the inguinal rupture: Only here, in attempting to reduce the parts by the hand, the preſſure ſhould be made directly upwards, inſtead of obliquely outwards as we directed in the other; and when theſe means are unfortunately found to fail, the operation itſelf muſt then be employed.

A free external inciſion was inculcated in caſes of inguinal hernia; and it is here equally neceſſary, if not more ſo, from the parts concerned lying much deeper than in the other. By too much timidity in making the external inciſion, operators frequently incommode themſelves much in all the ſubſequent ſteps of the operation. The external cut ſhould extend at leaſt from an inch above the upper end of the tumor to the ſame ſpace below its under extremity.

The membrana adipoſa, tendinous expanſion of the faſcia lata, and hernial ſac, being all cautiouſly divided, if the protruded parts are found in a ſituation proper for reduction, we ſhould immediately attempt to replace them; and as the ſpace below the ligament through which they have paſſed is conſiderable, this may frequently be done without dividing the ligament, merely by preſſure properly applied with the hand, while the patient's body is placed in the poſture we have already directed in bubonocele as being beſt ſuited for favouring a return of the bowels.

When in this manner the contents of the tumor can be reduced without the neceſſity of dividing the ligament, the patient is thereby ſaved from a great deal of hazard, as from the particular ſituation of the ſpermatic veſſels and epigaſtric artery with reſpect to this ligament, any cut made into the ſubſtance of the latter, runs the greateſt riſk of dividing one or other of theſe.

The ſpermatic veſſels as they go along to paſs out at the opening in the external oblique muſcle, run nearly upon the very edge or boarder of Poupart's ligament almoſt through its whole length, ſo that I conſider it as impoſſible to make a free diviſion of the ligament without cutting them acroſs.

We have been adviſed indeed by ſome, in order to avoid wounding the ſpermatic veſſels, which they acknowledge would certainly happen if the inciſion ſhould be carried directly upwards, to cut in an oblique direction outwards. In this method, they allow, that the epigaſtric artery, from the courſe it uſually takes, may very probably be divided: But the riſk attending the diviſion of that artery they do not conſider as of much conſequence; and if the diſcharge of blood occaſioned by its being wounded ſhould happen to be conſiderable, they ſpeak of it as a very eaſy matter to take it up by a needle and ligature, and needles of various ſhapes have been invented for this purpoſe. Even in emaciated people, however, it is a matter of much difficulty to reach the epigaſtric artery, and in corpulent patients it will be found altogether impoſſible to ſurround it with a ligature; ſo that beginners ought to be very cautious in receiving the directions uſually given on this ſubject. On reading the remarks of the late Mr Sharpe upon this point*, to ſecure the epigaſtric artery by means of a ligature, one would expect to be the eaſieſt of all operations; but the difficulty which in reality attends it, is ſuch, as muſt convince every one who has tried it, that Mr Sharp himſelf had never put it in practice.

But even although this accident of wounding the epigaſtric artery could be guarded againſt in the moſt eaſy and effectual manner, yet I will venture to ſay, when a femoral hernia is of any conſiderable ſize, the diſtenſion of the ligament thereby produced muſt bring the ſpermatic veſſels ſo nearly on a line with the under border of the ligament, as to render it altogether impoſſible to divide the one without the other; and whoever will examine theſe parts in the ſtate we have now deſcribed, will ſee that this cannot be avoided, whether the inciſion be carried directly upwards,

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[*] Critical Inquiry into the preſent ſtate of Surgery.

wards, or even obliquely outwards or inwards.

Some authors, from being ſenſible of the danger attending this part of the operation, have propoſed merely to *dilate* the paſſage, inſtead of dividing the ligament; and Mr Arnaud, a French writer on this ſubject, delineates a curved levator for the purpoſe of ſupporting the ligament till the protruded parts are reduced: But as we are to ſuppoſe in every caſe of ſtrangulated hernia, that the paſſage through which the parts have fallen down is already *dilated* to nearly its utmoſt poſſible extent, in ſuch a ſituation to attempt a farther *dilatation* without the aſſiſtance of the knife, would ſeldom, it is probable, be productive of any advantage.

A conſiderable time ago it occurred to me, that in this part of the operation ſome aſſiſtance might be derived from performing it in the following manner; and having ſince had occaſion to make trial of it in one caſe where it anſwered moſt effectually, I can now therefore recommend it with ſome certainty. Inſtead of dividing the ligament in the ordinary way, I only made an inciſion into part of its thickneſs: In order to protect the parts below, I firſt inſinuated the fore-finger of my left hand between the gut and the ligament; and then with a common ſcalpel made a cut of about an inch in length, beginning above and proceeding to the under border of the ligament.

The firſt ſcratch with the ſcalpel was very ſlight; but by repeated touches, it was made to penetrate almoſt through the whole thickneſs of the ligament, till at laſt a very thin lamella only of it remained: The finger being now withdrawn, the protruded parts were returned with great eaſe, the ligament at its weakened part yielding gradually as the neceſſary preſſure was applied for the reduction of the inteſtines.

As in this manner the opening may be enlarged to any neceſſary extent, and as the ſpermatic veſſels and epigaſtic artery are thus effectually avoided, the operation for this ſpecies of hernia may not only be done with equal certainty, but with the ſame degree of ſafety, as for any other kind of rupture. For, by not penetrating with the ſcalpel through the whole thickneſs of the ligament under which theſe blood-veſſels lie, they are thereby kept free from all kind of danger during this part of the operation; and, the preſſure to be afterwards uſed for the reduction of the protruded parts, if done in an eaſy gradual manner, as it ought always to be, can never injure them materially; as blood-veſſels of the ſize and ſtrength of which theſe are, eaſily admit of a degree of extenſion much more conſiderable than can be here required.

The femoral hernia being in other reſpects perfectly ſimilar to the inguinal, and the mode of treatment applicable to the one, being in every other circumſtance equally ſo to the other, it is not neceſſary to ſay any thing farther here concerning it: Only we may remark, with reſpect to bandages for retaining the dreſſings, both in this and every other ſpecies of hernia, except in bubonocele, as laſt deſcribed, in which the ordinary ſuſpenſory bandage of the ſcrotum anſwers the purpoſe in a very eaſy effectual manner, that in no other ſituation can a bandage be applied, without being productive of much inconvenience. For inſtance, the Spica, as it is termed, which, after the operation of crural hernia, uſed always to be employed, can never be applied but with much difficulty; nor does it anſwer the purpoſe properly: Inſtead of this or any other bandage, a piece of thin leather ſpread with any plaſter moderately adheſive, being applied over the dreſſings, retains them more effectually, and with much more eaſe.

We have elſewhere remarked, that from the particular conformation of the parts concerned in this diſeaſe, which is found to take place in females, that women are more liable to it than men. In them the ſame means of relief, and the ſame mode of operating, ought to be employed as we have already adviſed for male ſubjects. For, as the ſame riſk occurs here of wounding the epigaſtric artery, the ſame precautions are neceſſary for avoiding it; and by attending to the directions we have given upon this point, this may be always done with certainty.

SECTION V.

Of the Exomphalos, or Umbilical Rupture.

IN this ſpecies of hernia, the parts protruded from the abdomen paſs out at the umbilicus; and the contents of the hernial ſac are here, as in every other kind of rupture, exceedingly various. On ſome occaſions they conſiſt of inteſtines only; ſometimes of omentum only; and frequently of both. At other times, again, part of the ſtomach, the liver, and even the ſpleen, have been found in the ſac of an umbilical rupture.

As all the parts we have now mentioned, are, while in the abdomen, contained in the peritoneum, a hernial ſac, it is evident, muſt be here formed as well as in other ruptures, by that membrane being carried along with ſuch parts as are protruded. Accordingly, in every recent inſtance of umbilical hernia, this ſac is in general very evident; but when the tumor has become conſiderable in ſize, by a long continuance, and the great weight of its contents, the ſac, by the preſſure thus produced, becomes ſo connected with the neighbouring parts, that by many it has been doubted whether this ſpecies of hernia has a ſac or not. In ruptures of this kind the ſwellings ſometimes increaſe to ſuch a degree, as actually to burſt the ſurrounding parts; not only the ſac and cellular ſubſtance, but even the ſkin itſelf.

This diſorder occurs moſt frequently in infancy, ſoon after birth; and corpulent people are more liable to it than thoſe of a contrary habit, from this evident reaſon, that in the former, by the great bulk of contained parts, the ſurrounding muſcles are kept conſtantly diſtended, and the opening at the umbilicus through which the parts are protruded, is thereby made more pervious: For the ſame reaſon too, women in the laſt months of pregnancy are particularly liable to umbilical ruptures.

If the diſorder is attended to in due time, a bandage properly fitted to the parts will commonly effect a cure; and, in ſuch ſwellings as occur in pregnancy, a removal of the diſorder is, in general, a certain conſequence of delivery. But even in caſes of umbilical hernia in pregnant women, by having recourſe to a bandage on the firſt appearance of the diſeaſe, and by perſevering in its uſe for a proper length of time, if a cure cannot be obtained till delivery, the diſorder will at leaſt be prevented from receiving any farther increaſe, Both in male and female patients, due attention to the uſe of a truſs is abſolutely neceſſary in every caſe of hernia; but as in this ſpecies of the diſeaſe the ſwelling and different ſymptoms are always greatly aggravated by pregnancy, women in that ſtate ought to be particularly attentive to the ſmalleſt appearance of every ſwelling of this nature.

Although in many inſtances of umbilical rupture, different portions of the alimentary canal are found to be protruded; yet by experience we know, that the omentum alone is much more frequently the cauſe of ſuch ſwellings: And hence umbilical herniæ in general, are not productive of ſuch bad ſymptoms as uſually occur in the other kinds of rupture.

It does ſometimes happen, however, that portions of gut are protruded; and that the uſual ſymptoms of a ſtrangulated hernia occur. In which event, as a ſtricture of the paſſage through which the gut has fallen, is to be conſidered as the cauſe of the diſorder; ſo a cure, it is evident, muſt depend entirely on a thorough removal of that ſtricture. In performing this operation, a free external inciſion along the courſe of the tumor, is the firſt ſtep to be taken; and on laying the protruded parts bare by a cautious diviſion of the ſac, if they are found in a ſtate proper to be returned, and if that cannot be effected without an enlargement of the paſſage into the abdomen, this may be done with great ſafety, by introducing the finger, and enlarging the opening as far as is neceſſary with the blunt-pointed biſtoury. This inciſion, we may remark, may be made with almoſt equal ſafety in any direction; but leſt the ligament formed by the umbilical veſſels ſhould be wounded, which, however, would not probably occaſion much injury, yet if any perſon is apprehenſive of danger from that circumſtance, it may be always avoided by making the inciſion on the left-ſide of the umbilicus, and carrying it a little obliquely upwards and outwards.

When, again, the prolapſed parts, on being laid open, are found to be ſo far diſeaſed as to render their reduction improper, the directions formerly given for the treatment of ſimilar occurrences in other caſes of hernia, apply with equal propriety here, ſo that they need not now be repeated.

By Albucaſis, Guido, Aquapendens, and other authors, it has been propoſed, with a view to obtain a radical cure without having recourſe to the operation, to lift up the ſkin covering the tumor, with the finger and thumb, ſo as to ſeparate it from the gut underneath; when a ligature is ordered to be applied round the parts ſo held up, and to be made of ſuch a tightneſs as to induce a mortification of all the parts that lie anterior to it.

In other inſtances again, when the form of the ſwelling did not admit of this, the ſame precaution being taken as we have directed above for avoiding the gut, a needle containing a double ligature was introduced at the baſis of the tumor, near to its centre, and the ligatures were afterwards tied one above and the other below, of ſuch a degree of tightneſs as to induce the wiſhed for effect.

But as the practice thus recommended was not adequate to the deſign propoſed, as it did not prevent a return of the diſorder, and as the deſtruction of ſkin produced by it rendered every future deſcent more dangerous; ſo it is now, at leaſt by regular practitioners, very univerſally exploded.

SECTION VI.

Of Ventral Herniæ.

IN this ſpecies of hernia the parts forming the ſwelling are protruded between the interſtices of the abdominal muſcles. No part of the abdomen is altogether exempted from the occurrence of ſuch tumors, but they are moſt frequently obſerved in ſome of the parts moſt contiguous to the linea alba; and when the ſtomach alone happens to form the tumor, the ſwelling is ſituated juſt under, or immediately to one ſide of the xiphoid cartilage.

The treatment of this kind of rupture correſponds exactly with that of exomphalos. When the parts are reducible by the hand merely, a cure may be frequently obtained by the conſtant uſe of a truſs; and, again, when ſymptoms of ſtrangulation occur, which cannot be otherwiſe removed than by an inciſion through the ſtricture, this muſt be done in the manner directed in the laſt Section, ſo as to admit of the parts being replaced. The after-treatment of the parts concerned in the operation, is the ſame here as in other kinds of rupture.

SECTION VII.

Of the Hernia of the Foramen Ovale.

IN this variety of rupture, the viſcera protrude through the foramen ovale of the pubis and iſchium. It is not by any means a frequent diſorder; but, as it does ſometimes occur, it is neceſſary here to deſcribe it.

The ſymptoms in this kind of hernia being very ſimilar to thoſe produced by the ſtrangulation of inteſtines in other parts, it is not neceſſary to enumerate them here: Only it is proper to remark, that in this rupture the tumor is in men formed near to the upper part of the perinæum; and in women, near to the under-part of one of the labia pudendi. In both ſexes it lies upon the obturator externus, between the pectinæus muſcle and the firſt head of the triceps fæmoris.

The foramen ovale being partly filled up by a membranous or ligamentous ſubſtance, and in part by the obturatores muſcles, it was commonly ſuppoſed that this ſpecies of hernia aroſe from a relaxation of one or other of theſe; but as an opening is left in the foramen for the tranſmiſſion of different blood-veſſels and nerves, it is now known, that in this diſorder the viſcera paſs out at that opening, by gliding down in the courſe of theſe veſſels.

The general mode of treatment, as we formerly recommended for other ſpecies of hernia, muſt be here attended to; and when the parts are reduced, a truſs, properly adapted to the parts, muſt be truſted to for their retention. But as it will ſometimes happen in this, as in every other caſe of hernia, that reduction cannot be effected by the hand alone; in that event, the operation of dilating the paſſage thro' which the inteſtines protrude, is the only reſource. The tumor, however, that occurs in this diſorder, being in general ſo ſmall as ſcarcely to be noticed but by the moſt minute examination, unleſs a local pain, with the uſual ſymptoms of a ſtrangulated gut, lead to its detection, it is ſeldom diſcovered from its ſize, till it is too late to expect much aſſiſtance from art.

But whenever the operation becomes neceſſary, as it muſt always be when ſymptoms of ſtrangulation are diſcovered to have ariſen from a portion of gut being protruded, and which cannot by any other means be removed; in ſuch an event, after carefully laying the prolapſed parts freely bare, if they cannot then be reduced but by dilating the paſſage, and as death muſt be the certain conſequence if that ſhould not be effected, it ought at all events to be attempted: But as here it is impoſſible to enlarge the opening by means of any ſharp inſtrument, without dividing ſome of the blood-veſſels which paſs out at the foramen; and as ſuch an occurrence, from theſe veſſels being of a conſiderable ſize, would of itſelf, in all probability, end in the patient's death, the depth and ſituation of the parts rendering the application of a ligature impracticable; it is more adviſable, by means of ſuch a flat hook as is repreſented in Plate IX, fig. 2. to dilate the paſſage to a ſufficient ſize by gentle gradual ſtretching. By inſinuating the end of the hook between the inteſtine and ligament, and pulling it gradually from without inwards, a degree of dilatation may be obtained ſufficient for the reduction of the gut, without incurring that hazard which the diviſion of the ligament with the knife or any ſharp inſtrument, muſt always occaſion.

SECTION VIII.

Of the Hernia Cyſtica, or Hernia of the Urinary Bladder.

IN this ſpecies of rupture, the urinary bladder is the organ protruded; and the ſituations it occurs in are, either in the groin and ſcrotum, through the opening in the external oblique muſcle of the abdomen; in the fore-part of the thigh, under Poupart's ligament; or in the perinæum, through ſome of the muſcular interſtices of that part*. Inſtances have occurred, too, of the bladder being puſhed into the vagina, ſo as to form hernial tumors of no inconſiderable degrees of magnitude.

As only a part of the bladder is covered with the peritonæum; and as the bladder, in order to get into the opening in the external oblique muſcle, or under the ligament of Fallopius, muſt inſinuate itſelf between that membrane and the abdominal muſcles; it is evident, therefore, that the hernia cyſtica cannot be covered with a ſac, as inteſtinal ruptures uſually are. In the perinæum, again, that portion of the bladder moſt liable to fall into it, is in no way connected with the peritonæum. On ſome occaſions, this ſpecies of rupture occurs by itſelf, without any complication; and on others it is found to be accompanied with inteſtines and omentum, both in inguinal and femoral herniæ: When complicated with bubonocele, that portion of the bladder which is protruded lies between the hernial ſac and ſpermatic cord; that is, the inteſtinal hernia lies anterior to it.

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* An inſtance of this is recorded in Vol. IV. of Memoires de l'Academie Royalle de Chirurgie, by Monſ. Pipelet le Jeune, p. 181.

The uſual ſymptoms of this ſpecies of hernia are, A tumor, attended with fluctuation, either in the groin, in the forepart of the thigh, or perinæum, which generally ſubſides when the patient voids urine. When the ſwelling is large, before water can be made with freedom, it is commonly neceſſary to have recourſe to preſſure, at the ſame time that the tumor, when in the groin or thigh, is as much elevated as poſſible; but when the ſwelling is ſmall, and eſpecially when no ſtricture is as yet produced, the patient generally makes water with great eaſe, and without any aſſiſtance from external preſſure.

When a hernia of the bladder occurs without any complication, it is commonly found to proceed from a ſuppreſſion of urine. In the treatment, therefore, every cauſe of ſuppreſſion ought as far as poſſible to be guarded againſt; and when no adheſions take place, and if the protruded portion of bladder can be reduced, a truſs properly fitted to the part, ſhould be wore for a conſiderable length of time: And, again, when the parts cannot be reduced, ſo long as no ſymptoms occur to render the operation neceſſary, a ſuſpenſory bag, ſo fitted as effectually to ſupport the prolapſed parts, while at the ſame time it does not produce ſevere preſſure, is the only probable means of relief. When, again, a portion of bladder happens to protrude into the vagina, after reducing the parts, which is done by laying the patient on her back with her loins ſomewhat elevated, and preſſing with the fingers from the vagina, the prevention of future deſcents is in general effectually done by the uſe of the peſſary repreſented in Plate IX, fig. 1. And the ſame means, we may remark, are employed with ſucceſs in preventing a falling down of parts of the inteſtinal canal into the vagina; a ſpecies of rupture which now and then occurs.

It may happen, however, that the prolapſed parts, by being attacked with inflammation and pain in conſequence of ſtricture, may render the diviſion of the parts producing theſe ſymptoms as neceſſary in this as in any other caſe of hernia; in which event, the directions given in the preceding ſections for the treatment of inteſtinal herniæ, will be equally applicable here.—Only it muſt be remembered, that as in the hernia cyſtica without any complication, the protruded parts are not covered with a ſac; ſo a ſtill greater degree of caution is neceſſary in laying them

bare,

Plate IX.

Fig. 1.

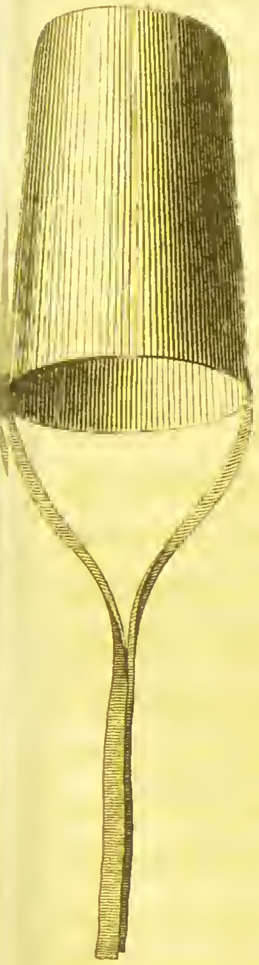


Fig. 2.

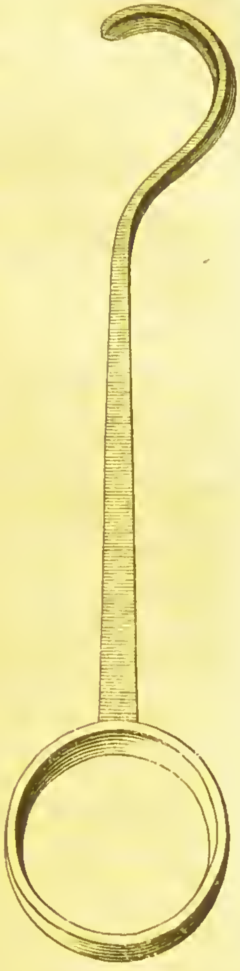


Fig. 4.

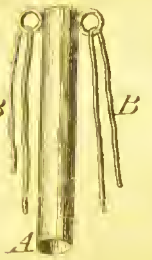
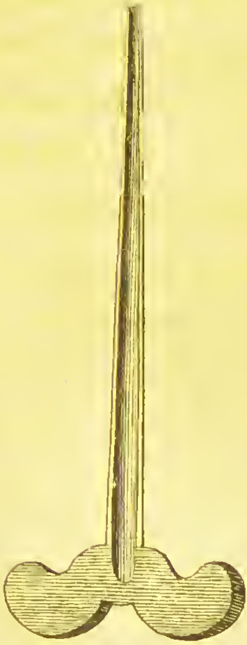


Fig. 3.



A Bell Sculp^{t}.

bare, than in the ordinary kinds of rupture.

It ſometimes happens, that ſtones are produced in that portion of the bladder which remains protruded; in which event, if it ſhould ever become neceſſary to cut into them, if the bladder can be eaſily retained in its prolapſed ſtate till the wound is healed, it ought always to be attempted, in order to prevent that extravaſation of urine internally which would otherwiſe occur, and which in all probability would do miſchief. The ſame precaution, too, becomes neceſſary, if, either by accident in the operation for the hernia cyſtica, the bladder ſhould be cut into; or if any part of it has been found mortified, ſo as to render it improper to return it into its uſual ſituation *.

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* The beſt accounts to be obtained of the various ſpecies of hernia may be had in the works of Le Dran, Heiſter, and of Mauchart in a treatiſe *De hernia incarcerata*; in the different volumes of *Memoires de l'Academie Royale de Chirurgie* of Paris; in the Medical Eſſays

EXPLANATION *of* PLATE VI.

Fig. 1. 2. and 3. repreſent different parts of a machine for injecting tobacco ſmoke by the anus.

Fig. 1. A braſs box for containing the burning tobacco. The mark *A* is a bottom or diviſion in the inſide of the box, perforated with ſmall holes to admit the paſſage of the ſmoke to the extremity of the box *B*; which, by a male ſcrew, is adapted to a braſs tube, fig. 3. at *D*, which is again fitted to an elaſtic leather pipe *E*, terminated by a common glyſter-pipe *F*. The pipe *E* is made of waxed leather, protected by braſs wire rolled ſpirally round it from one extremity to the other.

Fig. 2. repreſents the covering of the box,

ſays of Edinburgh; in the Works of the late Dr Monro; in Haller, *De hernia congenita*, in his *Opuſcula Pathologica*; in Mr John Hunter's very accurate account of the ſtate of the teſtis in the fœtus in Dr Hunter's Medical Commentaries; and in Mr Pott's valuable Treatiſe on Ruptures. Theſe are the beſt modern authors on this ſubject; and very little ſatisfaction is to be got from any of the ancient writers upon it.

box, fig. 1. to which it muſt be exactly fitted. *G*, a diviſion of thin braſs, perforated with a number of ſmall holes for admitting the paſſage of the air from a pair of bellows fitted to the opening *H*.

Fig. 3. The inſtrument completely fitted up on a ſmall ſcale. *I*, a pair of double bellows, whoſe tube *K* is fitted by a ſcrew to an opening in the cover of the box *L*, which again is terminated by the braſs tube *M*, the leather pipe *N*, and the ordinary glyſter-pipe *O*.

The box *L* being filled with burning tobacco, and the glyſter-pipe *O* being inſerted into the anus, by working the bellows *I*, any neceſſary quantity of ſmoke may be very quickly thrown up.

It is ſcarcely neceſſary to obſerve, that all the parts of this machine ought to be exactly fitted to one another, with a view to prevent effectually the eſcape of ſmoke at any of the joints.

Bellows of the ordinary ſize anſwer very well for this purpoſe; and are preferable to thoſe of a ſmaller ſize, as being better calculated for injecting the ſmoke quickly. The braſs box for the tobacco ſhould be about an inch and half in diameter, by three inches in length from the brim to the bottom; the braſs tube connected with the box ſhould be ſix inches in length, by a quarter of an inch in diameter. The leather pipe ought to be of nearly the ſame diameter with the tube, and about two feet and a half in length. When of this length, it is eaſier managed than when ſhorter; and it ſerves more effectually to cool the ſmoke before it is thrown into the bowels.

The glyſter-pipe at the end of the leather pipe ought to be ſomewhat larger and wider than thoſe in ordinary uſe.

EXPLANATION of PLATE VII.

Fig. 1. Another inſtrument for the purpoſe of injecting tobacco-ſmoke, originally invented by the celebrated profeſſor Gaubius. The principal difference between this and the inſtrument repreſented in

Plate VI. is, that in this the tobacco-box *A*, is fitted to the air-hole of the bellows; ſo that in working the bellows, the air with which they are ſupplied entering in at the openings *B*, the ſmoke of the burning tobacco muſt accordingly paſs through them; and from the bellows it is thrown into the other parts of the inſtrument, and in that manner is tranſmitted to the inteſtines.

The other inſtrument repreſented in Plate VI. is wrought with more eaſe than the one here delineated.

Fig. 2. A crooked biſtoury, with a blunt or probe point. The curve here repreſented is much leſs than is uſually given to this inſtrument, and the blade is alſo much narrower: It ought, indeed, to be altogether ſtraight, excepting a very ſlight curvature towards its point.

This biſtoury is well calculated for dividing the ſtricture in caſes of hernia; for opening ſinuſes in every ſituation; and particularly for dividing the rectum in the operation of the fiſtula in ano.

Fig. 3. A bandage for compreſſing the temporal artery, either after the operation of Arteriotomy, or in accidental diviſions of that artery. It is made of well tempered ſteel-ſpring, covered with ſoft leather, and of the ſame ſtrength as is uſed for the truſs of a hernia. The wound being dreſſed, and a ſmall compreſs of linen being applied over it, the limbs of the inſtrument are to be opened, and applied over the back-part of the head, ſo that their extremities *B D* may reſt upon the temples, and one of them be made to reſt exactly upon a compreſs covering the wound. If the inſtrument is made of proper metal, and of ſufficient ſtrength, it will remain exactly upon the part on which it is firſt placed without any aſſiſtance; but, to prevent its being rubbed off by accident, it is here furniſhed with a buckle and ſtrap *AC*, by which it may be firmly fixed by drawing them tight upon the fore-head.

This inſtrument ſhould be about three quarters of an inch broad; and from twelve to fourteen inches in length will anſwer for the dimenſions of any head.

I once had a ſcrew with a button adapted to this bandage, the button being made to preſs upon the divided artery; but the compreſs of linen here recommended, anſwers the purpoſe better, and is eaſier to the patient: Bandages made of linen or of other materials of a yielding nature, do not anſwer ſo well as thoſe of ſpring-ſteel which always remain with more certainty on the ſpot they are firſt placed upon.

EXPLANATION *of* PLATE VIII.

Fig. 1. A ſpring truſs for an inguinal or femoral hernia of the right-ſide. *A*, the bolſter or pad for preſſing upon the opening at which the parts have been accuſtomed to protrude. *B*, a ſtrap with holes in it for fixing upon the knobs on the back part of the pad. *C*, a ſtrap hanging down from the back-part of the bandage, to be paſſed between the legs of the patient, and to be alſo fixed upon the knobs of the pad by the holes in its extremity.

This ſtrap is intended to fix the bandage firmly in its ſituation; but if the bandage is properly fitted to the parts, and if the ſteel-ſpring of which it is compoſed is ſufficiently elaſtic, there is no neceſſity for the intervention of this ſtrap, which always frets and galls the parts upon which it is made to paſs.

Fig. 2. repreſents a bandage of this kind for the left-ſide, with no back-ſtrap.

Fig. 4. repreſents a double bandage of the ſame kind for a hernia on each ſide, with two back-ſtraps connected with it.

The ſteel of which theſe bandages are made ſhould be covered with thin ſoft leather, properly ſtuffed with wool or flannel, in order to prevent the parts from fretting by the preſſure neceſſarily produced upon them. The pads ought to be broader than they are generally made, with a prominence or ſlight elevation in the middle, while their ſides are made perfectly flat. Of this conſtruction they apply with much more exactneſs, and fit more firmly on the parts, than when altogether round as they are commonly made, without any flatneſs on their ſides.

Fig. 3. repreſents a bandage for umbilical ruptures. *A*, a ſteel ſpring to be applied upon the umbilicus after the hernia has been reduced, and to be retained in that ſituation by the bandage *B;* which, by means of the ſtraps *CCC* and the buckles *DDD*, may be kept at any degree of tightneſs. *EE*, two ſtraps for paſſing over the patient's ſhoulders; and *F* a ſtrap for paſſing between the legs, the whole to be fixed upon knobs on the back-part of the bandage oppoſite to the ſpring *A*. By means of theſe buckles and ſtraps the bandage may be preſerved very firmly in its ſituation.

The belt *B* ſhould be five or ſix inches broad, and the ſteel ſpring *A* ſhould be of a ſize proportioned to the opening it is intended to preſs upon. All the parts of the bandage ſhould be made of ſoft leather, lined with flannel or cotton *.

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* The ſpring here repreſented is taken from a figure repreſented by the late Dr Monro in his treatiſe on that ſubject. See his Works in 4to.

EXPLANATION *of* PLATE IX.

Fig. 1. A peſſary for the prevention of herniæ in the vagina. This peſſary conſiſts of a conical tube of ivory, ſilver, or gold, with a cord at its extremity, for the purpoſe of withdrawing it when neceſſary. The protruded parts being reduced, and this cone being rubbed over with oil, is to be introduced into the vagina, by which any farther deſcents may in general be prevented.

Peſſaries for this purpoſe have been formed of ſpring ſteel, but the ruſt which inſtruments of that metal are apt to contract, renders them very unfit for ſuch uſes.

Fig. 2. A hook deſcribed p. 364, for enlarging the opening in the foramen ovale in caſes of hernia of that part. This hook was originally propoſed by Mr Arnaud, a French author, for dilating the paſſage at which the parts protrude in caſes of crural hernia.

Fig. 3. A director open at the extremity, deſcribed p. 311, for the purpoſe of laying open the ſac in the operation of the bubonocele.

Fig. 4. A ſilver canula for introducing into the urethra after the operation of amputating the penis. The ſtrings with which it is furniſhed are intended to fix it to a circular bandage which ought to paſs round the patient's body.

CHAP. VI.

Of the HYDROCELE.

SECTION I.

General Remarks on Hydrocele.

EVERY tumor formed by a collection of water, might, from the import of the word, be with propriety denominated a Hydrocele; but the chirurgical acceptation of the term, implies a watery ſwelling ſituated in the ſcrotum or ſpermatic cord.

Swellings of this kind, as well as every other ſpecies of tumor in the ſcrotum or groin not immediately produced by the protruſion of parts from the abdomen, are by ancient writers termed Falſe or Spurious Herniæ, in oppoſition to thoſe deſcribed in the laſt chapter, which they diſtinguiſhed by the appellation of *True Herniæ*.

No real utility, however, is derived from this diſtinction; and as it aroſe from a very erroneous notion which prevailed of the origin of theſe diſorders, we ſhould not have thought it neceſſary to mention it here, but with a view to render intelligible the ideas of ancient writers upon this ſubject.

Indeed, the opinions concerning theſe diſeaſes, as handed down to us by all the older writers, by which I mean thoſe of the laſt and former centuries, are in general ſo confuſed and perplexed, that few of them are worth much attention: For, as they were very ignorant of the anatomy of the parts concerned, ſo the ideas they formed of the ſituation of the diſeaſes to which they are liable, were ſo erroneous, that the practice built upon them came to be very pernicious.—So little were they acquainted with the ſtructure of theſe parts, that they proceeded with much unneceſſary dread in the treatment of their diſorders; for, by ſuppoſing an immediate connection to ſubſiſt between the coats of the teſticle, the cavity of the abdomen, liver, kidneys, &c. they were induced to conſider the collections of water that occur in hydrocele, as depoſitions from theſe parts, and as tending to free them, and perhaps the ſyſtem at large, from ſome important diſorders. Different paſſages in Hildanus, Lanfranc, Fabricius ab Aquapendente, and even in Dionis's works, ſhow this to have been the idea of practitioners in the times of theſe authors.

In conſequence of this, their practice became timid and undecided; ſo that every chirurgical operation, in which thoſe parts were concerned, became a matter of great importance to reſolve upon, and very tedious, painful, and uncertain in the execution.

From the time of Celſus to the middle of the laſt century, very little progreſs ſeems to have been made in reducing the knowledge of theſe diſeaſes to greater certainty. Indeed, from Celſus downwards, authors ſeem to have copied almoſt exactly from one another, till Wiſeman, Le Dran, Garengeot, and Heiſter, gradually elucidated the ſubject: but they were never clearly and accurately deſcribed, till the diſcoveries of Monro, Haller, Hunter, and Pott, rendered the anatomy of the parts concerned plain and intelligible. So much attention, however, is ſtill given to the confuſed accounts of theſe parts as handed down by ancient writers, that the real nature of the diſorders of the teſticle and its appendages is leſs underſtood than it otherwiſe would be. There is no part, indeed, of chirurgical pathology, of which ſtudents in general are ſo ignorant as of this; and hence their notions of theſe diſeaſes, and of the anatomy of the parts in which they are ſeated, are commonly very indiſtinct.—Nothing but a ſtrict attention to the diſcoveries of late anatomiſts can convey clear and diſtinct ideas concerning them; and whoever will make himſelf thoroughly acquainted with theſe, will find, that the hydrocele, and other diſorders to which theſe parts are liable, are explained with as much clearneſs and ſimplicity as any other diſeaſe incident to the human body.

We have already, in the beginning of the preceding Chapter on Herniæ, given a deſcription of theſe parts, ſo far as related to that claſs of diſeaſes. To what was then ſaid, we muſt now beg leave to refer; and before proceeding to treat farther of the diſorders now under conſideration, we ſhall firſt enumerate ſuch particulars relating to the ſtructure of the parts concerned as were not formerly neceſſary to be mentioned.

In the anatomical deſcription already given of theſe parts, we made it appear, that on the teſtes with their blood-veſſels deſcending to the groin and ſcrotum, as they were while in the abdomen ſurrounded by the peritonæum in the ſame manner with the other viſcera, and as in their deſcent they bring a proceſs of the peritonæum along with them, ſo when in the ſcrotum, that they ſtill remain in the cavity of that membrane.

At the time of their falling down, and for a ſhort while thereafter, a direct communication ſubſiſts along this proceſs of the peritonæum between the teſtes and viſcera in the abdomen; but ſoon after this, except, as we formerly obſerved, in the caſe of a congenital hernia, the ſuperior part of the paſſage begins to contract, and in a ſhort time is entirely obliterated, from the opening in the external oblique muſcle down along the ſpermatic cord, to the upper part of the epididymis; the under part of the proceſs continuing looſe and open. In this manner the inferior extremity of the proceſs is converted into a kind of bag, the *tunica vaginalis teſtis*.

From the deſcription formerly given of theſe parts it appears, that the teſtis while in the abdomen is at its back-part firmly connected to the peritonæum, at which part the blood-veſſels, nerves, and vas deferens, communicate with it; ſo when in the ſcrotum, as the vaginal coat with which it is there ſurrounded is evidently a proceſs or continuation of the peritonæum, it muſt of neceſſity be ſtill connected with that membrane in the ſame manner as while it remained in the abdomen. And accordingly we find, that although the teſticle lies looſe in this ſac or vaginal coat in every other part, yet all along its poſterior part it is firmly attached to it. At this part the different veſſels of the teſtis ſtill enter; and at this part the peritonæum, or what is now the tunica vaginalis, is reflected over it, thereby forming the tunica albuginea, or immediate covering of the teſticle; ſo that the latter, viz. the tunica albuginea, is demonſtrably a mere continuation of the former or vaginal coat.

The inferior part of the peritonæal proceſs being ſomewhat wider below than above, leaves the tunica vaginalis of a pyramidal form; and it is alſo ſomewhat longer than the teſtis, reaching from the ſuperior part of the epididymis, where it begins, to a little below the inferior point of the teſticle, where it terminates. It is altogether of ſuch a ſize as to allow the teſtis to roll eaſily within it; its principal uſe appearing to be, to retain a ſmall quantity of a fine exhalation, which is conſtantly ſecreting, either from its own ſurface, or from the ſurface of the teſtis itſelf, for the purpoſe of keeping the latter moiſt and eaſy.

This vaginal coat which we have now deſcribed is the only looſe covering belonging either to the ſpermatic cord or to the teſtis: For although, by many writers on this ſubject, a vaginal coat of the cord is alſo deſcribed, together with a ſuppoſed ſeptum between it and the vaginal coat of the teſtis; yet no ſuch covering is, on diſſection, found to exiſt. The ſuperior part of the peritonæal ſpermatic proceſs, we have already ſeen, is entirely cloſed up very ſoon after the deſcent of the teſticle; and a firm adheſion being produced between the ſides of the ſac all along the courſe of the cord, no veſtige whatever can be traced, either of a vaginal coat of the ſpermatic cord, or of any particular ſeptum between that and the teſticle: This it is of ſome importance to attend to, as the diſeaſes of theſe parts cannot otherwiſe be properly underſtood.

As the diſeaſes we are now to treat of are chiefly ſeated in the coverings of the teſtis, we have been more particular in rendering their ſtructure clear and obvious, than is neceſſary in deſcribing the teſticle itſelf; with reſpect to which we ſhall only obſerve, that it is evidently very vaſcular, being compoſed almoſt entirely of different convolutions of blood-veſſels.

Independent of the vaginal coat proper to each teſticle, the two teſtes have for their farther protection a more external covering, the *ſcrotum:* A bag formed almoſt entirely of ſkin and cellular ſubſtance, for that body the dartos which has commonly been ſuppoſed to be muſcular, is now clearly proved to be altogether cellular.

Even the ſeptum ſcroti, or that membrane which divides one teſtis from another, is compoſed of cellular ſubſtance in a more condenſed ſtate. By air it is eaſily inflated, and it is equally pervious to water; ſo of courſe it partakes of all thoſe watery effuſions, which the more external parts of the ſcrotum are liable to.

It is very neceſſary to be acquainted with this ſtructure of the ſcrotum, as from the deſcriptions which till of late have been given of it, young practitioners are induced to conſider it as muſcular, and to ſuppoſe the ſeptum with its rapha to be ligamentous; and hence they are led to be more cautious than they need be in performing operations upon it*.

We have thus entered with as much minuteneſs into the the anatomy of theſe parts as is neceſſary for underſtanding their diſeaſes; and the nature of this undertaking not admitting of a more particular diſcuſſion,

* See the Works of the late Dr Monro, p. 551.

ſion, we ſhall now proceed to conſider the different ſpecies of hydrocele, the immediate object of this chapter.

All the varieties of hydrocele which have been mentioned by authors, may, I think, be comprehended under the two following ſpecies, *viz.* the anaſarcous, and encyſted. In the former, the water is diffuſed over all the ſubſtance of the part in which it is ſeated; the ſwelling is not collected in any particular cavity, but occupies equally all the cells of the part: In the latter, viz. the encyſted, the water is collected in one diſtinct bag; and a fluctuation of a fluid is in general perceptible to the touch.

The ſcrotum, with its contents the teſticle and its appendages, are liable to both ſpecies of the diſorder; and the ſpermatic cord with its coverings, are alſo liable to both. We ſhall firſt treat of the ſcrotal affections of this kind.

SECTION II.

Of the Anaſarcous Hydrocele of the Scrotum.

THE ſcrotum from being entirely cellular, and being connected immediately with the trunk of the body, is thereby rendered liable to partake of every diffuſible ſwellingwith which the general conſtitution is attacked: And accordingly we find, that anaſarcous ſwellings of other parts of the body, ſeldom ſubſiſt for any length of time, without producing a ſimilar affection of the ſcrotum. A local anaſarcous fullneſs of the ſcrotum unattended with any general affection, has on ſome occaſions been produced by a local cauſe; *viz.* by the accidental preſſure of a tumor on the lymphatics of the part; by external injury; and by an effuſion of urine from a rupture of the urethra; but ſuch occurrences are very rare, a general diſeaſe of the conſtitution being the uſual fore-runner of ſuch tumors.

So ſoon as water is collected in any conſiderable quantity in the ſcrotum, a ſoft, inelaſtic, colourleſs tumor, is obſerved over the whole of it; preſſure of the finger or of any hard body is eaſily received, and the mark of ſuch preſſure is for ſome time retained by it: The ſkin at firſt preſerves its natural appearance; and the rugæ of the ſcrotum, which in a ſtate of health are always remarkable, are not for ſome time much altered; but as the ſwelling advances they gradually diſappear, till at laſt they are totally obliterated: The ſwelling, from being at firſt ſoft and of a doughy feel, by degrees turns more firm; and the colour of the ſkin, from being for ſome time very little altered, at laſt acquires an unnatural white, ſhining appearance. As the diſorder increaſes the tumor by degrees acquires a larger ſize; and from being originally confined to the uſual boundaries of the ſcrotum, it at laſt ſpreads up the groin; and the penis being likewiſe affected, becomes ſo ſwelled and diſtorted, as to be productive of much inconvenience and diſtreſs: And although the ſcrotum is compoſed of parts which readily admit of extenſive dilatation, yet in ſome inſtances, the ſwelling here becomes ſo enormous as to burſt the ſurrounding parts entirely.

The various appearances we have enumerated are ſo characteriſtic of the diſeaſe, as to render it almoſt impoſſible to confound this ſpecies of ſwelling with any other tumor to which the ſcrotum is liable.

We have already obſerved, that inſtances now and then occur of ſcrotal anaſarca being produced by a local cauſe; but by much the greateſt proportion of all ſuch caſes depend upon a general hydropic tendency; ſo that the cure of this kind of hydrocele muſt depend almoſt entirely on the removal of that habit of body which originally produced it.

The treatment of the general diſorder of the conſtitution falls to the province of the phyſician, ſo we ſhall not here enter upon its conſideration; but the aſſiſtance of Surgery is frequently required for relieving that great diſtreſs, which theſe tumors always produce, when they arrive at any conſiderable degree of magnitude.

In ſuch circumſtances, the object of Surgery, is, by drawing off the water from the tumor, to diminiſh the ſize of it as much as poſſible; which not only affords much immediate relief, but is a means of the diſtended parts recovering their tone more readily than they otherwiſe would do.

Different methods have been propoſed for evacuating the water; *viz.* by the introduction of a ſeton, by the trocar, by inciſions, and by punctures.

All theſe methods, that by the trocar excepted, ſerve very effectually to evacuate the diffuſed water; and therefore we are to adopt that mode which not only creates leaſt pain, but which is leaſt liable to be productive of troubleſome conſequences: And this unqueſtionably is the method by punctures.

The ſeton and long ſcarifications may evacuate the water ſomewhat more quickly than punctures; but in dropſical conſtitutions, ſuch as this ſpecies of hydrocele is commonly connected with, they almoſt conſtantly go wrong.

For the firſt twenty-four hours or ſo, ſcarifications give the patient much ſatiſfaction; the water is almoſt entirely evacuated, the tumor is of courſe greatly diminiſhed, and much relief is thereby obtained. About this time, however, the ſcarified parts commonly begin to fret, their edges turn hard and inflamed, and by degrees an eryſipelatous kind of appearance ſpreads over the neighbouring parts.

That fretful uneaſineſs which was at firſt complained of, by degrees turns into what the patient terms a burning kind of pain, which frequently becomes ſo tormenting as to deſtroy reſt entirely; and it but too commonly happens, that all the applications employed for relief, have no manner of influence, in preventing the acceſſion of gangrene, by which the patient is at laſt in general carried off.

I will not ſay that ſuch ſymptoms are always induced by ſcarifications, but I have in many inſtances obſerved them; and on the contrary, although punctures do now and then terminate in the ſame manner, yet they are by no means ſo ready to do ſo *.

As ſcarifications are ſo apt to produce miſchief here, there is much reaſon to ſuſpect, that either the trocar or ſeton, which both give ſtill more irritation, would commonly prove more hurtful. They are now accordingly in this ſpecies of hydrocele very generally laid aſide.

When ſcarifications are to be employed, the method of doing it, is, with the ſhoulder of a lancet to make two or three inciſions on the moſt depending part of the ſcrotum, each of an inch in length, and extending no deeper than the cutis vera: And when punctures are to be depended on, they are to be made of the ſame depth with the *point* of a *ſpear-pointed lancet;* and five or ſix on the moſt prominent part of the tumor will commonly prove ſufficient.

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* Vide Le Dran's Operations, with Cheſelden's notes, p. 116; and Treatiſe on Hydrocele by Mr Pott, p. 40.

That number will in general evacuate the water very quickly; but if they ſhould ever happen not to be fully adequate to the effect propoſed, or if in the courſe of a day or two theſe now made ſhould be found to heal, they may be renewed from time to time as often as is neceſſary.

Preſerving the parts as dry as poſſible, by a frequent renewal of dry ſoft linen cloths, in order to imbibe the moiſture, is here a very neceſſary piece of attention; the want of it, I am convinced, is the cauſe of much of the miſchief that frequently enſues from operations of this kind.

When either ſcarifications or punctures go wrong, by beginning to inflame and turn painful in the manner we have already deſcribed; inſtead of the warm emollient poultices and fomentations uſually employed, a cold ſolution of ſaccharum ſaturni, applied upon ſoft linen, not only proves more effectual in putting a ſtop to the farther progreſs of the inflammation, but affords more immediate relief to the patient's preſent diſtreſs. Aqua calcis employed in the ſame manner proves alſo a very uſeful application.

When, however, the diſorder proceeds to gain ground, by a real mortification coming on, we muſt immediately have recourſe to bark and other remedies uſually employed in ſuch affections. But as we have elſewhere treated this ſubject very fully, it is unneceſſary to enter into a more particular conſideration of it here[*].

It may only be proper to obſerve, that although in general, when the ſcrotum in caſes of anaſarca happens to mortify, the greateſt danger is to be dreaded; yet now and then very unexpected cures are obtained, after all the teguments have been deſtroyed by mortification. A remarkable caſe of this kind occurred ſome years ago in the Royal Infirmary here: The whole ſcrotum ſeparated, and left the teſticles quite bare. During the time that the ſore kept open, all the water collected in other parts of the body was evacuated, and by the uſe of large quantities of bark and mild dreſſings to the ſore, the patient got well. In the courſe of the cure, the teſtis became inveloped with a kind of cellular ſubſtance, which ſerved as a very good means of protection. It muſt have been ſome production of this kind, I ſuppoſe, which Hildanus ſpeaks of as a regenerated ſcrotum *.

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[*] Vide Treatiſe on Ulcers, &c. Section IV. *On Mortification.*

We have already obſerved, that although this ſpecies of hydrocele for the moſt part depends upon a general dropſical tendency, that ſome inſtances, however, occur, of a a local cauſe producing a mere local dropſy of the ſcrotum. Thus it has been known to occur, from ſwellings in the groin and in the abdomen, obſtructing the paſſage of the refluent lymphatics. When this is the caſe, if the tumors producing ſuch obſtructions can be extirpated, no other means will afford ſuch effectual relief; but when they are ſo deeply ſeated as to render any attempt for removing them improper, the practice we have already pointed out, of

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* Obſervat. Chirurg. cent. 5. obſ. 76.

of punctures in the moſt depending part of the tumor, muſt be employed with a view to palliate ſuch ſymptoms as occur.

It ſometimes happens in caſes of ſuppreſſion of urine, either from caruncles in the urethra, from ſtones impacted in it, or from collections of matter, that the urethra burſts, and the urine in this manner finding a paſſage into the ſcrotum, an anaſarcous ſwelling of it is in that manner ſuddenly produced, which ſtill continues to increaſe till the cauſe giving riſe to it is removed *.

In order to prevent the formation of ſinuſes, which in ſuch circumſtances will otherwiſe occur, an inciſion ſhould be inſtantly made into the moſt depending part of the ſcrotum, and carried to ſuch a depth as is ſufficient for reaching the wound in the urethra. In this manner a free vent will not only be given to the urine already diffuſed, but the farther collection of it may very probably be prevented. If a ſtone impacted in the urethra is found to be the cauſe

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* Monro's works, p. 569.

cauſe of this effuſion, it ought to be cut out; if a collection of matter is detected, the abſceſs ſhould be opened; and if caruncles in the paſſage form the obſtruction, bougies ſhould be employed for their removal.

The obſtructing cauſe being thus removed, if the patient's habit of body is good and untainted with any venereal or other general affection; by dreſſing the ſore properly with ſoft eaſy applications, the opening into the urethra will frequently be brought to heal, and a complete cure will be in this manner obtained. But when ſuch ailments are complicated with any general diſorder of the ſyſtem, particularly with old venereal complaints, it frequently happens, that neither mercury or any other medicine has much influence in their removal.

Every practitioner muſt have met with inſtances of this kind. Both in the hoſpital and in private I have met with ſuch caſes, where, notwithſtanding all the means employed for relief, the paſſage from the urethra remained open, and continued to diſcharge conſiderable quantities of urine.

Inſtances of ſcrotal anaſarca of a local nature, have alſo occurred, from the rupture of a hydrocele of the tunica vaginalis teſtis: When this ſpecies of hydrocele arrives at a great ſize, jumping from a height, or a violent blow or bruiſe of any kind, will readily burſt it; and the water not finding a paſſage outwardly, muſt of courſe diffuſe itſelf over the whole ſcrotum. Different inſtances of this kind have occurred; two of which are related by Douglaſs *. And the ſame kind of ſwelling has been produced by the water of a hydrocele of the vaginal coat being improperly drawn off by the operation of tapping. When the orifice in the ſkin, is allowed to recede from the opening into the vaginal coat before the water is all diſcharged, the remainder of the collection is very apt to diffuſe itſelf

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* Treatiſe on the Hydrocele, by John Douglaſs, p. 8.

itſelf through all the cellular ſubſtance of the ſcrotum.

In whichever of theſe ways the ſwelling is produced, the cure ought to conſiſt in laying the tumor ſufficiently open, not only for evacuating the diffuſed water, but for effecting a radical cure of the hydrocele of the tunica vaginalis.

We have thus enumerated all the varieties of anaſarcous ſwellings to which the ſcrotum is liable, together with the modes of treatment adapted to each: For with reſpect to the hydrocele of the dartos, a diſeaſe particularly deſcribed by ancient writers, as that part of the ſcrotum is now known to be altogether cellular, ſo any water collected in it muſt tend to form that very diſeaſe we have now been deſcribing, an anaſarcous ſwelling of the whole ſcrotum.

We now proceed to the conſideration of that ſpecies of the diſorder, which, from its being ſeated within the cavity of the ſcrotum, we have termed the *encyſted hydrocele of the ſcrotum.* Of this there are two varieties, *viz.* the hydrocele of the tunica vaginalis teſtis; and that ſpecies of tumor formed by water collected in the ſac of a hernia.

SECTION III.

Of the Hydrocele of the Tunica Vaginalis Teſtis.

WHEN treating of the anatomy of theſe parts, we remarked, that an aqueous ſecretion is always in a ſtate of health found in the cavity of the tunica vaginalis; the principal uſe of which ſeems to be, to lubricate and keep eaſy the ſurface of the teſticle.

In a healthy ſtate, this fluid is abſorbed by the lymphatics of the part; its place being as conſtantly ſupplied by a freſh ſecretion: But in diſeaſe, it frequently happens, either that the power of the ſecreting organs is morbidly increaſed, or that the powers of the abſorbing veſſels of the part are diminiſhed. The effect of either of theſe cauſes muſt be, to induce a preternatural collection of water in the cavity of the vaginal coat; and by a gradual accumulation of this fluid, the ſpecies of hydrocele now under conſideration is at

laſt

laſt produced. The ſymptoms and appearances of the diſorder are as follow.

A fulneſs is at firſt obſerved about the inferior part of one of the teſticles, which is at this time ſoft and compreſſible; but as the tumor increaſes in ſize, ſo it alſo becomes more tenſe: No degree of preſſure can make the ſwelling diſappear either at this or any other period of the diſeaſe: The teguments at firſt preſerve their natural appearance, both as to colour and rugoſity; but as the water accumulates, the ſkin gradually becomes more tenſe, although ſeldom or never to ſuch a degree as to obliterate the rugæ of the ſcrotum entirely.

The ſhape of the tumor, which was at firſt nearly globular, becomes gradually more pyramidal, being larger below than above: In the firſt ſtages of the diſorder, the ſwelling does not extend farther than the uſual boundaries of the ſcrotum; but in proceſs of time, it advances by degrees up to the abdominal muſcles; ſo that altho' in the early period of the diſeaſe, if it is not combined with hernia, or a hydrocele of the cord itſelf, the ſpermatic proceſs may be always diſtinctly felt, in its more advanced ſtate it cannot poſſibly be diſtinguiſhed. The weight of the tumor being now very great, the ſkin of the neighbouring parts is dragged ſo much along with it, as to cauſe the penis to ſhrink conſiderably, and ſometimes to diſappear almoſt entirely: And in this advanced ſtate of the diſeaſe, the teſticle, which uſually lies at the back part of the tumor, and which for ſome time after the commencement of the diſorder could be diſtinctly felt, cannot now be evidently diſcovered. On a minute examination, however, a hardneſs is always to be felt along that part of the ſcrotum where the teſtis is ſituated: And a fluctuation of a fluid *may in general* be diſtinguiſhed through the whole courſe of the diſeaſe.

It *ſometimes* happens, however, in that very tenſe ſtate of the tumor, which a long continuance of the diſeaſe uſually occaſions, that the fluid contained in it cannot be evidently diſtinguiſhed: Nor in this ſituation is the ordinary characteriſtic mark of hydrocele more to be depended on; I mean, the tranſparency of the tumor when expoſed to the light of a candle or of the ſun. In the early ſtages of the diſeaſe, when the contents of the tumor have not become diſcoloured, and when the vaginal coat has not yet acquired much thickneſs, the contained fluid, on being expoſed to this trial, always appears tranſparent; and when it does ſo, is always a corroborating proof of the exiſtence of water: Yet its abſence is by no means a proof of the contrary; for as the tranſparency of the tumor depends entirely on the nature of its contents, and on the thickneſs of its coverings, whatever tends to render the one leſs clear, and the other of a more firm texture, muſt in proportion to its effect invalidate the certainty of this teſt.

During the whole courſe of the diſorder the patient does not complain of pain in the tumor itſelf; but ſome uneaſineſs is commonly produced in the back, by the weight of the ſwelling on the ſpermatic cord: this, however, is generally either prevented altogether, or is at leaſt much alleviated, by the uſe of a proper ſuſpenſory bandage.

Theſe are the uſual appearances of hydrocele when the diſeaſe is confined to one ſide of the ſcrotum, which it generally is: But on ſome occaſions a double hydrocele is met with, by both teſticles being affected in the ſame manner; in which caſe, the tumor, inſtead of being confined to one ſide of the ſcrotum, occupies the whole of it equally.

As there are ſome diſorders with which this ſpecies of hydrocele is apt to be confounded, it is particularly neceſſary to attend to ſuch circumſtances as moſt readily characteriſe it. Theſe diſorders are, All the variety of ſcrotal herniæ; the anaſarcous hydrocele of the ſcrotum; the encyſted hydrocele of the ſpermatic cord; the ſarcocele, or ſcirrhous teſticle; and the hernia humoralis, or inflamed teſtis.

When treating of herniæ, we enumerated ſuch circumſtances, as, when properly attended to, will almoſt always ſerve to diſtinguiſh this ſpecies of hydrocele from every variety of theſe diſorders: To what was then ſaid, we muſt here therefore refer*.

With the anaſarcous tumor of the ſcrotum it has on ſome occaſions, we are told, been confounded; but the means of diſtinguiſhing the two diſeaſes are ſo evidently pointed out in the hiſtories we have given of their appearances, as to render it quite unneceſſary to enter farther into their conſideration. Indeed it muſt be groſs inattention only, which can ever render the anaſarcous ſpecies of hydrocele liable to any degree of doubt.

From the encyſted hydrocele of the ſpermatic cord, it may commonly be eaſily diſtinguiſhed, by the teſticle in the latter being plainly felt at the under part of the tumor; whereas in this diſeaſe, when the teſtis is perceptible, it is always at the back-part of it: And in this ſpecies of hydrocele, the ſwelling begins in the under part of the ſcrotum, and proceeds upwards; whereas in the encyſted hydrocele of the cord, it makes its firſt appearance above the epididymis, and by degrees falls down to the inferior parts of the ſcrotum. By this difference alone theſe two ſpecies of hydrocele may be always diſtinguiſhed from one another.

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* See page 301.

The circumſtances which moſt clearly diſtinguiſh this kind of tumor from a ſcirrhous teſticle, are, that in the latter the ſwelling is hard and firm; it does not yield in any degree upon preſſure; the ſurface of the tumor is rough and unequal; it is in general attended with a good deal of pain, and is always heavy in proportion to its ſize: Whereas in hydrocele, the ſwelling commonly yields to preſſure; its ſurface is always ſmooth; little or no pain occurs; and the tumor is light in proportion to its bulk.

Theſe differences will always ſerve as a ſufficient diſtinction between this ſpecies of hydrocele, and a pure unmixed ſarcocele. But when a ſcirrhous teſticle is combined with an effuſion of water into the tunica vaginalis, forming what has very properly been termed a *hydro-ſarcocele*, the means of diſtinction are not ſo obvious. In the incipient ſtate of ſuch effuſions, the difference between the two diſeaſes is ſufficiently apparent; but in the latter ſtages of it, the moſt attentive obſerver commonly finds it difficult, and ſometimes impoſſible, to mark the diſtinction. In ſuch doubtful caſes, however, by proceeding in the cautious manner to be afterwards pointed out, no detriment will occur to the patient from any uncertainty of this nature.

From the *hernia humoralis* this ſpecies of hydrocele is eaſily diſtinguiſhed. In the former, the tumor ſucceeds either immediately to ſome external bruiſe; or is evidently the conſequence of a gonorrhœa, or ſome other inflammatory affection of the urethra *. The ſkin is more or leſs affected with an inflammatory redneſs; it is attended with a conſiderable degree of pain, eſpecially on handling; and the ſwelling is hard and firm; ſo of courſe no fluctuation can be diſtinguiſhed in it, unleſs in its more advanced ſtate, when ſuppuration has taken place, and when the uſual ſymptoms of abſceſs, particularly the pointing of the tumor, and its being much diſcoloured, ſerve to diſtinguiſh it ſufficiently.

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* The operation of lithotomy is frequently attended with an inflammation of one, and ſometimes of both, of the teſticles; probably from the inflammation induced by the operation in the neighbourhood of the caput galinaginis, being communicated along the vas deferens to the teſtes.

In forming a prognoſis of this diſeaſe, we muſt be entirely directed by the habit of body of the patient. In general, we are to conſider it as a local affection; and in that ſtate the moſt favourable expectations may be formed of its event; for, whatever may have been alleged by ſome writers as to the hazard of every operation for a radical cure of the diſorder, a ſimple unmixed hydrocele, in a ſound healthy conſtitution, may at any time be operated upon, with a very fair proſpect of ſucceſs.

In the radical cure of the hydrocele, in whatever way it is attempted, ſome pain is occaſioned; the parts inflame, and of courſe ſome degree of fever muſt be expected.

pected. In ſome inſtances, theſe ſymptoms have gone rather farther than was juſt neceſſary; but under the limitations I have already mentioned, of an unmixed ſtate of the diſorder in a conſtitution otherwiſe healthy, whenever the operation has been properly performed, I can ſafely aver, that of a very conſiderable number I have operated upon myſelf, as well as of many I have been connected with, I never knew one inſtance of any thing bad occurring.

But on the contrary, in conſtitutions otherwiſe diſeaſed; in old people; and in infirm habits of body; we are by no means to expect ſuch certain ſucceſs: Even in ſuch circumſtances, the operation does very frequently ſucceed; but it muſt be acknowledged, that it now and then fails. The ſymptomatic fever is apt to run too high for the patient's ſtrength to ſupport; and the ſuppuration produced by a high degree of inflammation tends afterwards to deſtroy entirely the remains of a conſtitution already much impaired.

This, however, ought not to be laid to the account of the operation, but to the real diſeaſed ſtate of the patient.

When, therefore, this diſorder occurs in a healthy conſtitution, I would conclude, from all the experience I have ever had in it, that little or no danger is to be dreaded from any neceſſary operation: And on the contrary, in a diſeaſed ſtate of body, that ſome riſk is always incurred by every operation that takes place; and the degree of riſk we may ſuppoſe will be always in proportion to the nature and extent of that diſeaſe with which the conſtitution is affected.

So long as a ſwelling of this nature keeps within moderate limits, patients in general rather ſubmit to the inconvenience produced by it, than undergo the pain of an operation; at leaſt this is commonly the caſe among people of better rank, who can more readily put up with any diſtreſs which it occaſions, than the poorer ſet of patients, whoſe daily labour is frequently impeded by large tumors in the ſcrotum. Among thoſe of the former claſs, inſtances occur of the diſorder having exiſted for a great length of time without being productive of much inconvenience: But even among theſe it commonly happens, that they become anxious; fatigued with uncertainty; and are at laſt induced to ſubmit to the operation.—In all ſuch inſtances, when the conſtitution is otherwiſe ſound, this may be undertaken, as we have already remarked, with an almoſt certain proſpect of ſucceſs; but when the ſyſtem is materially diſeaſed, a patient had better ſubmit to any inconvenience produced by the diſorder, than undergo an operation for a *radical cure:* And this may be the more eaſily agreed to from the relief which people with tumors of this kind always experience from tapping, which is termed the *palliative cure;* and which, when it is properly done, if the conſtitution is not greatly impaired indeed, may be always ſubmitted to without any dread of its proving hazardous.

Various methods are propoſed by authors for the treatment of this diſorder.

All of them, however, may be reduced to two general heads; viz. ſuch as have in view only a temporary relief, and which, as we have juſt now obſerved, is termed the *palliative cure;* and ſuch as are intended for effecting a *radical cure*, or a final removal of the diſorder.

Whatever advantages may be experienced, from the uſe of internal medicines, in dropſical affections of the conſtitution at large, no practitioner, I believe, has ſo much confidence in remedies of this kind, as to expect much benefit from them in any partial hydropic collections of the encyſted kind: We have daily proofs of their general failure in almoſt every affection of this nature; and in no ſpecies of dropſy do they prove more ineffectual than in hydrocele.—We are told, indeed, of cures having been performed by different medicines, particularly by the uſe of ſtrong draſtic purgatives: I have known them employed, but never with advantage; and when puſhed to any extent, they are ſure to hurt the conſtitution.—As it is always neceſſary however to confine the patient to bed for ſome time after any operation that takes place, in order to prevent his being afterwards diſturbed, it is proper to empty his bowels by a laxative immediately before the operation; but this is almoſt the only medicine that can be requiſite. Internal medicines, therefore, being found ineffectual, as well as external applications, we are to ſeek for that relief from Surgery which experience ſhows it is capable of affording.

When the tumor in the ſcrotum has acquired ſuch a ſize as to become inconvenient, if the patient either refuſes to ſubmit to the operation for the radical cure, or if his ſtate of health renders that operation improper, in ſuch circumſtances, the palliative treatment, or a mere evacuation of the water by puncture, is the only means we can employ.

There are two methods propoſed for drawing off the water in this manner, viz. by the puncture of a lancet, or with a trocar.—It is alleged by ſome, that by the mere puncture of a lancet the water can neither be ſo

Plate X.

Fig. 2.

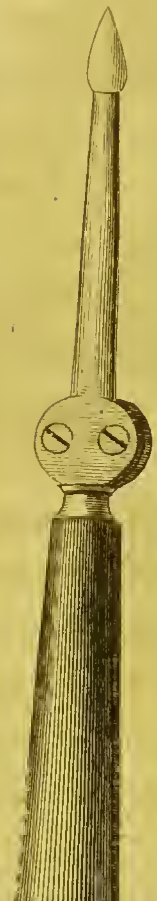


Fig. 3.

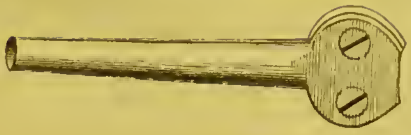


Fig. 4

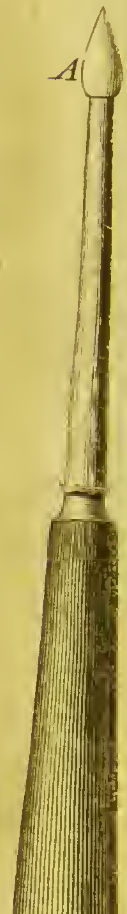
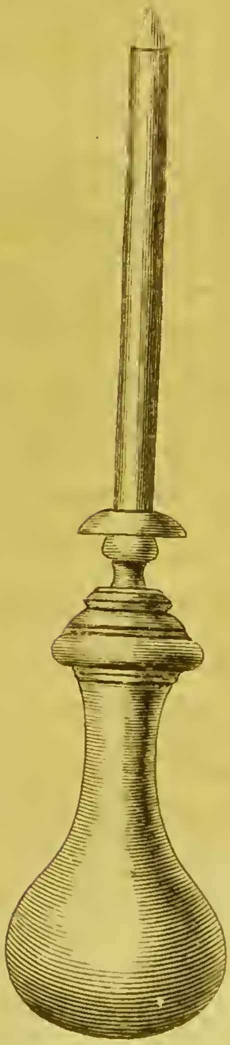


Fig. 1.



A. Bell Sculp.

ſo completely or ſo properly drawn off as when the trocar is employed; for the orifice in the ſkin being apt to recede from the opening into the vaginal coat, the water is thereby either ſtopt altogether, or inſinuates itſelf into the ſurrounding parts. By others again it is ſaid, that the difficulty of introducing the trocar is ſuch as to render it hazardous from the contiguity of the teſticle; and inſtances are not wanting to ſhow, that even in the hands of expert ſurgeons the teſtis has been very materially injured by a trocar reaching it in this operation. Indeed, the ordinary form of this inſtrument, which is triangular, renders its introduction both difficult and unſafe; but the trocar of a flat form which I propoſed ſome years ago, enters with as much eaſe as a lancet.—In Plate X. different inſtruments of this kind are repreſented, of a proper ſize for this operation.—And as with a trocar of this kind an opening may be made into the tunica vaginalis with perfect ſafety, and the water with this inſtrument being much more freely evacuated than by a mere puncture with a lancet, which is apt to produce an effuſion into the cellular ſubſtance of the ſcrotum, the mode of effecting it by the lancet ought to be entirely laid aſide.

The inſtrument being fixed upon, the next point of importance is the part of the tumor moſt proper for the operation. Even in this ſimple operation, an acquaintance with the anatomy of the parts will appear to be very neceſſary. We have already ſhown, that the teſtis does not hang altogether looſe in its vaginal coat; but on the contrary, that its poſterior part is firmly connected to the body of the teſticle; ſo of conſequence at this part there is no water to be met with between the ſcrotum and teſtis; and accordingly it would be highly improper to attempt an opening at this place: For if through ignorance the trocar ſhould be inſerted at this place, one inſtance of which I have ſeen, the inſtrument muſt for certain pierce the body of the teſticle, and will not after all, evacuate the water.

The moſt proper part for introducing the inſtrument is the moſt anterior point of the under part of the tumor. The patient being ſeated on a chair, with the tumor hanging over the edge of it, the operator with his left-hand ſhould graſp the tumor on its back-part, ſo as to puſh the contained fluid as much as poſſible into the anterior and under part of the ſwelling. Having done ſo, he then makes an opening through the ſkin and cellular ſubſtance, of half an inch or ſo in length, with the ſhoulder of a common lancet, on that point where the trocar is to enter. This gives very little pain to the patient; it is done in the ſpace of a ſecond or two, and it enſures an eaſy paſſage to the point of the inſtrument; a circumſtance which diveſts this operation of all kind of hazard.

The operator now takes the trocar in his right-hand, and having fixed the head of the inſtrument in the palm of the hand, he places the fore-finger along the courſe of it, leaving juſt as much of the point of the

the inſtrument uncovered as he thinks ought to penetrate the tunica vaginalis; and this being introduced in a gradual eaſy manner, the ſtilette is to be withdrawn immediately on the end of the canula having entered the cyſt. The water will now run off; and if the tumor is not of a great ſize, it may be all evacuated at once: but when the ſwelling is large, as the ſudden diſcharge of its contents, by taking away too quickly the ſupport which they afforded to the veſſels of the teſtes and vaginal coat, might endanger the rupture of ſome of them, it is better every now and then to ſtop the flow of water for a few ſeconds; and when the whole is thus evacuated, and the canula withdrawn, a piece of adheſive plaſter ſhould be immediately applied to the orifice, and a compreſs of ſoft linen being laid over the ſcrotum, the whole ſhould be firmly ſupported by a proper application of the T-bandage *.

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* Some very judicious remarks on the importance of a due degree of compreſſion in ſuch caſes may be met with in Dr Monro's obſervations on this ſubject, *loco citato.*

The patient being in this ſtate laid into bed, it commonly happens, that in a few hours all manner of uneaſineſs is gone, and he goes about his ordinary buſineſs without farther interruption: Now and then, however, the ſore produced by the trocar feſters; and the inflammation thus produced, in ſome inſtances, has been known to terminate in a radical cure of the diſorder. Such occurrences, however, are rare, and are by no means to be depended on.

This operation, when done with attention, is of a very eaſy nature, and is ſeldom productive of any miſchief; but when not cautiouſly performed, and the patient being allowed to go about immediately after the water is evacuated, it ſometimes terminates in very troubleſome ſymptoms. Even when done with every neceſſary caution, if the patient's habit of body is bad, it does ſometimes go wrong. Of this every practitioner may have ſeen ſome inſtances more or leſs remarkable: And two caſes are related by Mr Pott; one of which terminated fatally; and in the other a mortification enſued, which in the ſpace of a few days deſtroyed not only a good deal of the ſcrotum, but even a conſiderable portion of the tunica vaginalis *. Both of theſe indeed occurred in very unhealthy conſtitutions; but it is proper to have it known, that this operation may in ſuch habits of body be productive of theſe conſequences. In ſound healthy people, it ſeldom or never ends in any thing bad; and the event of theſe caſes of Mr Pott and others, ought to convince us that it ſhould not be attempted where the ſyſtem is evidently much diſeaſed.

Drawing the water off in this manner in order to relieve the patient from the bulk it produced, was the firſt idea that occurred to our forefathers in the treatment of hydrocele; but this being found ineffectual for the complete removal of the diſeaſe, various other methods were afterwards introduced. The actual cautery and the ligature were both propoſed as means of

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* Caſes xxi. and xxii. Treatiſe on the Hydrocele.

of preventing farther deſcents of water from the abdomen, which in former times was conſidered as the origin of this diſorder. Celſus orders the cyſt of a hydrocele to be cut away, and many of his followers do the ſame. Tents, both ſolid and hollow, were afterwards employed; as was the uſe of the ſeton, which we find recommended by Fabricius ab Aquapendente, and other writers even of a more early period. The uſe of various applications of the cauſtic kind has at different times been in vogue: Injecting wine, diluted ardent ſpirits, and other irritating liquids, into an opening in the vaginal coat, has been propoſed as a means of inducing a degree of inflammation ſufficient for effecting a radical cure; and a ſimple inciſion of the cyſt containing the water, has been recommended for the ſame purpoſe.

Theſe, I think, comprehend all the variety of means which at different periods have been employed for the cure of hydrocele. Ancient practitioners ſeem to have been acquainted with all of them;

but by having very inaccurate ideas of the anatomy of the parts concerned, they could not have any fixed or clear opinion of the manner in which any of their remedies operated in effecting a cure. In conſequence of this they were applied very much at random; and no method proving at all times ſucceſsful, the ignorance they laboured under in the theory of the diſorder rendered changes of remedies very frequent in its treatment.

One material advantage obtained by the moderns in this point is, that by knowing the water to be here contained in a particular cyſt with which no part of the body communicates, they are thereby left at liberty to apply their remedies without any dread of injuring parts formerly ſuppoſed to be connected with the teſticle; and by finding that the water collected in this diſeaſe, is in many reſpects in a ſimilar ſituation to the contents of other tumors, with the means of curing which they are well acquainted, they have ventured from analogy to transfer the method of treatment found to ſucceed in theſe diſorders, to this ſpecies of hydrocele.

Matter collected in a particular cavity or cyſt, we ſuppoſe to be in circumſtances very ſimilar to water collected in the tunica vaginalis teſtis. In both ſituations, the contents of the tumor are ſecluded from acceſs to the external air; and neither of them have any communication with any other part of the body. And although the bag containing the matter of an encyſted tumor is in ſome meaſure a new formation, yet in many inſtances it is found to be equally firm and elaſtic with the tunica vaginalis teſtis.

In the treatment of encyſted tumors, practitioners are now agreed, that, beſides evacuating the matter, means muſt be employed for deſtroying the cavity which contained it, otherwiſe a return of the diſorder may with certainty be expected. To accompliſh this, different methods have been propoſed; ſome with a view to deſtroy entirely the cyſt which contained the matter; and others, as it is ſaid, to fill up the cavity of the cyſt with a formation of new parts.

But we now know, that unleſs the coats of a cyſt are much extended, and greatly thickened indeed, that there is no reaſon whatever for removing any part of it. It is alſo known, that to fill up the cavities of tumors with a creation of new parts, is a mere imaginary matter, being what neither art or nature ever effects to any extent: And we likewiſe know, that the cavity of almoſt every tumor may be more effectually deſtroyed by producing an adheſion of its ſides than by any other means.

Parts of the human body in a ſtate of inflammation very readily adhere to one another. Indeed ſo eaſily do they do ſo, that ſome art is required to prevent the adheſion of contiguous inflamed parts. By attempting the cure of abſceſſes and of encyſted tumors, on principles analogous to this, the ſame phenomena were found to happen; for, after diſcharging their contents, it has been found, that cures are commonly obtained with more eaſe and certainty by inducing a ſufficient degree of inflammation on their internal ſurfaces, than by any other means. And in like manner it is now known, that the hydrocele of the tunica vaginalis, may be treated upon the ſame principles, and with the ſame general effects.

This is the moſt ſimple idea that can be given, of the preſent views of practitioners in the treatment of this diſorder; and I hope it will ſerve to render their ideas reſpecting it ſufficiently clear.

The intention, then, of every means now in uſe for the radical cure of this ſpecies of hydrocele, is, to induce ſuch a degree of inflammation on the parts, as may tend to obliterate entirely, the cavity of the tunica vaginalis, by making it adhere firmly to the tunica albuginea or ſurface of the teſticle.

Some individuals, indeed, ſtill proceed upon the ſuppoſition of a total deſtruction of the ſac being neceſſary for a complete cure of hydrocele. But the extenſive experience of many of the beſt employed ſurgeons makes it appear very clear that this is never neceſſary. When the ſac has become very thick, and has been diſtended to ſuch a degree as entirely to have loſt its tone, removing a ſmall part of it ſometimes proves uſeful, by allowing the ſcrotum to contract more readily; but in no other point of view is it in any degree requiſite.

We know well, that in this, as in every ſpecies of encyſted tumor, a cure may be, and frequently is, obtained, by removing the ſac entirely; for, the contiguous parts from whence the ſacs have been diſſected, adhere very readily together, ſo as to deſtroy effectually the cavities in which the matter was contained *. But we alſo know that this is never neceſſary, as the ſame end may be always obtained by much more gentle means.

We ſhall now proceed to the particular conſideration of the ſeveral means at preſent

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* Mr Elſe aſſerts, that in the method he recommends of curing this ſpecies of Hydrocele by cauſtic, the tunica vaginalis ſloughs entirely off.

ſent employed by different practitioners for effecting a cure, and ſhall treat with moſt minuteneſs thoſe which are now in moſt general uſe. Theſe are, exciſion of the tunica vaginalis; the application of cauſtic; the uſe of a ſeton; and a ſimple inciſion of the ſac.

By Mr Douglas it was recommended * to deſtroy the vaginal coat entirely; and his method of doing it, is, firſt to diſſect out an oval piece of the ſcrotum, which he conſiders as always neceſſary; and having then laid the vaginal coat open, to cut it away by different ſnips of a pair of ſciſſars. But if there is any practitioner who ſtill continues to prefer this exciſion of the ſac, it will be found to be much more eaſily diſſected away by the ſcalpel than with ſciſſars, and it is very rarely neceſſary to remove any portion of the ſcrotum.

The method of cure by cauſtic is commonly deſired to be conducted in the following manner: The ſcrotum being ſhaved, a piece of common paſte-cauſtic properly

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* Loco citato.

ſecured with adheſive plaſter is to be applied, of about the breadth of a finger, the whole length of the tumor; and if, on removing the cauſtic, it has not penetrated the tunica vaginalis, this is ordered to be done with a ſcalpel, ſo as to evacuate the contents, lay bare the teſticle, and admit of proper dreſſings *.

But Mr. Elſe, one of the lateſt writers in favours of the method by cauſtic, ſays, that there is no neceſſity for ſuch an extenſive application of cauſtic as has been recommended by authors; and that an eſchar of the ſize of a ſhilling, anſwers the purpoſe ſufficiently, which is always fully obtained by the application of cauſtic-paſte of the ſize of a ſixpence, and which he directs to be laid upon the anterior and under point of the ſcrotum properly ſecured by adheſive plaſter in order to prevent its ſpreading †.

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* Douglas on the Hydrodcele,. p. 3. Pott, *loc. cit.* p. 155.

† *Vid.* An Eſſay on the Cure of the Hydrocele of the tunica vaginalis teſtis, 2d edition, p. 33.

The cauſtic commonly produces all its effects in the ſpace of five or ſix hours, and may then be removed. Digeſtives, or an emollient poultice, muſt now be applied over the ſcrotum, properly ſuſpended with a bandage.

An inflammation, we are told, is ſoon induced over the whole tunica vaginalis; and the febrile ſymptoms which ſucceed, are directed to be kept moderate by blood-letting, injections, &c. In a few days the eſchar of the ſcrotum ſeparates and comes away; and in a gradual manner, in the courſe of four, five, or ſix weeks, the whole tunica vaginalis, comes off, when the wound immediately cicatriſes, and a complete cure is obtained.

When the ſeton is to be uſed; the following is the method of applying it, as recommended by Mr Pott, who has wrote a very ingenious treatiſe on this ſubject: He uſes a trocar; a ſilver canula, five inches in length, and of ſuch a diameter as to paſs eaſily through the canula of the trocar; and a probe, ſix inches and a half long, having at one end a fine ſteel trocar point, and at the other, an eye which carries a cord of coarſe white ſewing-ſilk, of ſuch a thickneſs as will paſs eaſily through the long canula. With the trocar, the inferior and anterior point of the tumor is to be pierced; and as ſoon as the perforator is withdrawn, and the water diſcharged, the ſeton canula is paſſed through that of the trocar, till it reaches the upper part of the tunica vaginalis, and can be felt in the very ſuperior part of the ſcrotum. This being done, the probe armed with its ſeton is to be conveyed through the latter canula, the vaginal coat and teguments to be pierced by its point, and the ſeton to be drawn through the canula till a ſufficient quantity is brought out at the upper orifice, when both canula's are to be withdrawn, and the operation is finiſhed.

About the third day or ſo, the parts inflame; when fomentations, poultices, a ſuſpenſory bandage, a temperate regimen, and lax belly, are ordered, to keep the ſymptoms moderate: So ſoon as the parts are quite eaſy by the inflammation being much diminiſhed, which is generally about the tenth or twelfth day, the ſeton is begun to be diminiſhed, when ſix or eight threads are withdrawn at every dreſſing; the dreſſings conſiſting of nothing more than a ſuperficial pledgit upon each orifice, and a diſcutient cerate, ſuch as the ceratum ſaturninum, to cover the ſcrotum.

In uſing the ſeton, I ſhould wiſh to follow the method here deſcribed, in every other point except in the mode of introducing it; an eaſier method of doing it being now diſcovered. In a former publication, I have deſcribed the manner of opening abſceſſes by a ſeton; and the directions then given, prove equally applicable here. Let an opening be made, either with a ſcalpel or a lancet, in the ſuperior part of the tumor, large enough to admit with eaſe a cord of white ſewing ſilk of a proper ſize. The curved director with an eye at one end *, in which the cord is inſerted, is to be introduced at this opening

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* Delineated in the Treatiſe on the Theory and Management of Ulcers, &c.

and its farther extremity being carried down to the moſt depending part of the tumor, an opening is there to be made of about half an inch or ſo in length, by cutting upon the end of the director with a ſcalpel. The director being now drawn down till a ſufficient quantity of ſilk is left hanging out below, the operation is then finiſhed. In every other reſpect the management of the ſeton ought to be the ſame as is recommended by Mr Pott.

By making the firſt opening in the ſuperior part of the tumor, the inſtrument conducting the ſeton is more eaſily introduced to the farther extremity of the ſwelling, than when the firſt opening is made below; for in this caſe, the tumor remains diſtended to the laſt: Whereas, when opened below, the water ruſhes out immediately; and the vaginal coat collapſes ſo about the teſticle, that I have ſeen a good deal of difficulty in getting the inſtrument inſinuated between them, by which I have been ſenſible of the teſtis being conſiderably injured.

Before ſaying any thing farther of this method of cure by the ſeton, we ſhall proceed to deſcribe the operation for a radical cure by inciſion.

The patient being placed upon a table of a convenient height, and being properly ſecured by two aſſiſtants, with the ſcrotum lying nearly upon the edge of the table, the operator with one hand ſhould graſp the tumor ſo as to hold it firm and make it ſomewhat tenſe on its anterior part; and with a common round-edged ſcalpel in the other, he is now to divide the external teguments by one continued inciſion from the ſuperior extremity of the tumor all along its anterior ſurface down to the moſt depending point of the ſwelling.

By this means, as the divided ſcrotum retracts a little, the tunica vaginalis is laid perfectly bare, for the breadth of half an inch or ſo, from one extremity to the other. An opening is now to be made with a lancet into the vaginal coat, juſt at its upper extremity where the firſt inciſion commenced. This opening ſhould be of ſuch a ſize as to receive the operator's finger, which being inſerted, the probe-pointed biſtoury is to be conducted upon it, and by means of it the ſac is to be divided to the very bottom, all along the courſe of the firſt inciſion. By the previous diviſion of the ſkin with the ſcalpel inſtead of the biſtoury, the operation is done with much more accuracy, and with leſs pain; for the ſcalpel from its convexity admits of a much finer edge than an inſtrument of any other form is capable of receiving, of courſe it cuts with more eaſe.

By making the firſt opening into the ſac at the upper end of the tumor, much trouble and inconvenience is prevented, which, making the firſt orifice below, is ſure to occaſion: For, as we have before remarked, when the tumor is firſt opened below, the water is inſtantly evacuated; and as that produces an immediate collapſe of the tunica vaginalis, the paſſage thro' its cavity is not afterward eaſily diſcovered. Whereas, by making the firſt opening above, as the water is thereby evacuated gradually as the inciſion is extended downwards, the vaginal coat continues diſtended to the bottom till the inciſion is completely finiſhed.

We have not thought it neceſſary to ſay any thing here of the probe-pointed ſciſſars, an inſtrument ſome time ago very generally employed in this operation; for wherever the knife can with propriety be uſed, no ſurgeon of theſe times will heſitate in preferring it.

We have directed the inciſion into the vaginal coat to be carried from one extremity of the tumor to the other. Many ſurgeons, in order to ſave a little pain to the patient, adviſe the inciſion both of the ſcrotum and tunica vaginalis to be only two thirds of the length of the tumor. But the difference of pain thus produced is very little; being indeed nothing when compared with the uncertainty it leaves of a radical cure not being obtained by it. When the inciſion is carried the whole length of the tumor, it is very rarely found to fail; and I have known ſundry inſtances of theſe partial openings being attended with a return of the diſeaſe*.

The inciſion being completed in the manner directed, the teſticle covered with its tunica albuginea comes into full view. Sometimes the teſtis protrudes from the wound altogether; in which caſe it muſt be replaced with great caution, and it ought by all means to be covered as quickly as poſſible from the external air; and provided none of the tunica vaginalis is to be removed, this may be always done immediately by finiſhing the dreſſing directly on the ſac being opened.

When the ſac is not much thickened, there is no neceſſity whatever for removing any part of it; but when it is diſcovered to be otherwiſe; to be thick and very hard; the removal of a portion of it on each ſide of the inciſion, makes the cure of the remaining ſore more eaſy and expeditious. As in this hardened ſtate, the ſac generally ſeparates with great caſe from the ſurrounding teguments, any quantity of it may be eaſily taken away with the ſcalpel without the leaſt hazard of wounding the ſcrotum. Some writers indeed adviſe part of the ſcrotum itſelf to be cut away on every occaſion [*]; but even in the moſt enlarged caſe of hydrocele I ever met with, no neceſſity ever appeared for removing any part of it.

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* Mr Pott is clearly of this opinion. *Loc. cit.* p. 163.

On examining the teſticle after the diviſion of the vaginal coat, it is generally found to be of a ſoft texture, and of a more pale complexion than in a healthy ſtate: On ſome occaſions it is found to be conſiderably enlarged; and on others, I have ſeen it reduced to a very ſmall ſize, conſiſting of the tunica albuginea almoſt quite empty. As the cure of the ſore however advances, the teſticle in a gradual manner commonly regains its uſual bulk; of this I have ſeen different inſtances, and a very remarkable caſe of the ſame kind is recorded by Douglas [†].

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[*] *Vide* Douglas on the Hydrocele, p. 136.

[†] *Loc. cit.* p. 194, Caſe II.

We have hitherto ſuppoſed that the diſorder is confined to one ſide of the ſcrotum; but now and then, as we have elſewhere remarked, a double hydrocele is met with. The ordinary practice in ſuch a caſe, is, to do the operation twice both of the ſcrotum and tunica vaginalis: in all its parts; to lay each collection open from top to bottom, by a double inciſion Sometimes both operations are done at the ſame time; but in general practitioners are afraid of too much inflammation being thus induced, ſo that one is commonly allowed to heal before the other is attempted. In this manner the patient is expoſed to delay, uncertainty, and to the hazard of two complete operations.

It may be done, however, in a much eaſier manner, with much leſs pain, and in leſs time, than in the ordinary method.

After finiſhing the operation on one ſide, by making an opening into the vaginal coat of the oppoſite teſticle at its upper extremity through the *ſeptum ſcroti*, and continuing the inciſion down to the bottom of the tumor, the cyſt is thus equally well laid open, the water is as completely evacuated, and the patient is liable to as little hazard of a return of the diſorder, as if the operation had been done in the uſual manner.

From the account we gave of the anatomy of the ſcrotum, no danger, it is evident, can occur from any diviſion of the ſeptum, which we have ſhown to be entirely compoſed of cellular ſubſtance; and in fact I have twice had an opportunity of performing this operation in the manner here directed upon a double hydrocele, and in both inſtances with moſt complete ſucceſs.

Whether the hydrocele be double or confined to one teſticle, ſo ſoon as the water is all evacuated, and any part of the vaginal coat removed that may be neceſſary, the wound is then to be dreſſed; and on this, it may be obſerved, much of the ſucceſs to be expected from the operation depends.

If the vaginal coat be juſt wrapped about the teſticle without the interpoſition of any kind of dreſſing, partial adheſions are very apt to occur, before a degree of inflammation is produced ſufficient for rendering the cure complete. By this means cavities are left, which are either filled with pus during the progreſs of the cure, or afterwards afford an opportunity for collections of water, and thus occaſion a return of the diſorder; different inſtances of which I have met with.

And again, a deſire for ſtuffing the cavity of the ſore too much with dreſſings has alſo been a frequent cauſe of miſchief. By their rubbing or preſſing too much upon the ſurface of the tunica albuginea, a part which nature never intended to be much expoſed, ſuch a degree of inflammation is ſometimes induced as to be productive of much pain, inflammation, and fever: But it is commonly the operator's fault when this is the caſe; for in a ſound healthy conſtitution, it very ſeldom happens that either of the occurrences here mentioned take place, when the dreſſings are properly managed.

The method I have uniformly found to

ſucceed here, is this: The teſticle, if it has puſhed forwards, as it ſometimes does, out of the ſcrotum entirely, being cautiouſly replaced, a piece of very ſoft lint is to be inſerted between it and the divided vaginal coat, firſt on one ſide of the divided ſac, and then on the other, from the ſuperior part of the tumor to its moſt depending point. One end of each piece of lint ought to be left out of the ſore, to fold over the edges of the wound; and the other ought to be gently puſhed in between the teſtis and vaginal coat, about half-way between the external inciſion and the bottom of the ſac: If leſs is inſerted, it does not with certainty anſwer the purpoſe; and I have commonly found that a ſingle ply of fine lint may be introduced this length without any difficulty, and experience ſhows it to be ſufficient. A compreſs of ſoft linen being now applied over the tumor, the whole ſhould be properly ſuſpended with a bandage; for this purpoſe, either the T-bandage, or the common ſuſpenſory bag, may be employed. The patient is now to be carried to bed; an anodyne ſhould be preſcribed; and he ought to be enjoined to remain as much in the ſame poſture as poſſible, for much motion in this ſtate of the ſore certainly does miſchief.

The intention of this operation being to induce a moderate degree of inflammation over the parts chiefly affected, viz. the tunica vaginalis and tunica albuginea, if the pain, inflammation, and ſwelling, which in ſome degree always ſucceed to the operation, do not run to a great height, nothing is to be done for the firſt two or three days after the operation: But, when theſe ſymptoms become violent, and eſpecially when any conſiderable degree of fever is induced, it muſt then be the buſineſs of art to prevent their going too far. The remedies to be uſed for this purpoſe, are, blood-letting, according to the ſtrength of the patient; gentle laxatives, ſo as to preſerve an eaſy ſtate of the bowels; a low cooling diet; and warm emollient poultices and fomentations to the part, in order to forward a plentiful ſuppuration, which commonly tends to moderate every bad ſymptom more effectually than any other remedy.

By theſe means the inflammation may in almoſt every inſtance be kept within proper bounds: From all the experience, indeed, which I have had in this diſorder, I might ſay *in every inſtance*, for I never yet ſaw any thing to the contrary; where the operation was properly performed, in a ſound healthy conſtitution.

When, again, the pain, inflammation, and tumefaction of the parts, do not come to a great height, the cataplaſms and fomentations need never be employed before the fourth day: About this time, by fomenting the parts, and applying a large emollient poultice over the whole, the external dreſſings are commonly eaſily removed about the fifth or ſixth day. At this time, on taking them away, the edges of the ſore are obſerved to be hard, and conſiderably ſwelled; and the matter diſcharged is thin and diſcoloured: If the lint inſerted between the teſtis and the vaginal coat can be eaſily taken out, it may at this time be removed; but in general, it does not come away with freedom till the third or fourth dreſſing, when the ſwelling of the parts is ſomewhat diminiſhed. The ſore ought to be dreſſed once every day or two, according to the quantity of matter produced; and the poultices ſhould be continued till a plentiful ſuppuration is eſtabliſhed.

In twelve or fourteen days from the operation, the ſuppuration is in general very freely formed; and the ſwelling of the parts is now ſo much reduced as to give the whole a fine healing appearance: The only dreſſing neceſſary in this ſtate of the ſore, is a little ſoft charpee, covered with a pledgit of any emollient ointment. The ſwelling of the ſcrotum now gradually ſubſides; and the ſore continuing to leſſen daily, a complete cure is commonly obtained in the ſpace of four, five, or ſix weeks, according to the ſize of the wound and other circumſtances.

Having thus given an account of the manner of performing every operation at preſent in uſe for the radical cure of the hydrocele, we ſhall now make a few obſervations on the comparative advantages of the three laſt, viz. the cauſtic, ſeton, and ſimple inciſion; theſe being almoſt the only means now practiſed for the removal of this diſorder. From the teſtimony of many reſpectable authors concerning the efficacy of each of theſe, there is no reaſon to doubt, but that collections of this kind may in general be cured by any of them. That the cauſtic, when properly managed, will ſeldom fail of producing a cure, we have every reaſon to believe; and the ſame may be ſafely aſſerted both of the ſeton and ſimple inciſion. But, it commonly happens, that a practitioner, from being prejudiced in favours of a particular method, continues to practiſe that mode and no other; and, finding it in general to ſucceed, he by degrees comes to perſuade himſelf, that other methods of cure which he has not had ſuch opportunities of becoming acquainted with, are liable to objections, which thoſe who have practiſed them do not find to be the caſe.

I attended the hoſpitals in London about the time that Mr Pott's publication on the Seton, and Mr Elſe's Treatiſe on the Cure of the Hydrocele by Cauſtic, were publiſhed; when of courſe the various means of curing the diſorder were frequently the ſubject of medical converſation. I was thereby induced to pay particular attention to the ſubject; and by having the advantage of ſeeing the practice of different hoſpitals, and not being particularly biaſſed in favours of any one method, I had thereby an excellent opportunity for forming an opinion: And the reſult of all the obſervation I was either at that time able to make, or ſince that period, both in the hoſpital here, and in private practice, is this, That although all the three modes of operating, by cauſtic, the ſeton, and ſimple inciſion, are perhaps equally capable of producing a radical cure; yet that, of the three, the latter, viz. the ſimple inciſion, is liable to fewer objections, and effects a cure both with leſs trouble to the operator, and with leſs riſk to the patient; and of the other two, the treatment by cauſtic appears to me to be the moſt eligible.

I have ſeen all the three methods produce troubleſome ſymptoms, ſuch as great pain and tenſion of the abdomen, inflammation, and fever; but from much obſervation, I can without heſitation ſay, that the ſeton is *more frequently* productive of ſuch conſequences than either of the others: And we need not wonder at its being ſo; for the cord which is here introduced, lying in cloſe contact with the body of the teſtis, muſt neceſſarily occaſion a conſiderable and continued irritation, ſo long as it remains applied to it.

The ſeton is attended with other inconveniences too, which neither of the others, when properly managed, are liable to. When the inflammation which ſucceeds to the introduction of the cord, runs very high, as it frequently does, it commonly terminates in ſuch a plentiful ſuppuration, that the matter produced by it cannot be readily diſcharged at the openings made for the ſeton: In conſequence of this, it inſinuates into the neighbouring parts; and different abſceſſes are accordingly formed, which muſt all be diſcharged by ſo many openings. Even when the operation has been done with much nicety and attention, I have ſeen it terminate in this manner.

Another objection to this operation, which I think of importance, is this; that it does not admit of a free examination, either of the ſtate of the teſticle, or of the fluid contained in the ſac. I know, that in a ſimple uncomplicated hydrocele, there is no reaſon whatever for examining the teſticle; nor would we think of removing it, either for a mere enlargement or diminution of its ſize, provided it is not otherwiſe diſeaſed. But we know well, that caſes do now and then occur, which baffle all the ſcrutiny of practitioners; no diagnoſtic ſymptoms we are yet acquainted with, being ſufficient to direct us with abſolute certainty.

The moſt experienced practitioner muſt

be ſenſible, that at times he has been miſtaken in his opinion reſpecting the nature of ſuch tumors; a real ſarcocele, or ſcirrhous teſticle, attended with ſome effuſion of a fluid, being now and then miſtaken for a pure unmixed hydrocele; and *vice verſa*, a ſimple uncomplicated caſe of hydrocele has been frequently miſtaken for, and treated as, a ſcirrhous teſticle. Such occurrences every practitioner muſt have met with: And among other writers who confeſs their having been deceived in ſuch caſes, a very candid acknowledgment of this kind is made by Mr Pott [*]; and Mr Elſe takes notice of a ſimilar occurrence in which he was concerned [†].

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[*] Treatiſe on the Hydrocele, p. 288. In this caſe, which from every circumſtance had been conſidered as a Sarcocele, the teſtis, after being removed, was found to be perfectly ſound; the diſeaſe being a *real Hydrocele* of the tunica vaginalis.

There being even a *poſſibility* only of ſuch an occurrence with ſuch an attentive obſerver as Mr Pott, ought to ſerve as a moſt convincing argument with practitioners in general, of the neceſſity of proceednig with the utmoſt caution in all ſuch caſes where there is the leaſt cauſe for doubt.

[†] *Loc. cit p.* 4.

I have myſelf been concerned in different caſes, where the moſt experienced ſurgeons were at a loſs to determine the real nature of the diſorder; that is, whether the ſwelling in the ſcrotum was a ſimple hydrocele of the vaginal coat, or an effuſion of a fluid into that bag produced by a ſcirrhous teſticle. In all ſuch caſes where any doubt occurs, the ſurgeon ought to proceed as if the tumor was a real hydrocele. If, on laying open the ſwelling, the teſticle ſhould be found diſeaſed, that is, if it ſhould be in ſuch a ſtate as to require extirpation, it ought to be removed immediately; and on the contrary, if it ſhould appear to be perfectly ſound, the caſe ſhould undoubtedly be treated altogether as a ſimple hydrocele.

In ſundry inſtances of this kind, where, by different practitioners, a mere collection of water was expected without any other affection, the teſticle has been found to be ſo much diſeaſed with a real ſarcocele, as to render extirpation highly proper. Now, if in ſuch circumſtances a cure had been attempted by the ſeton, the teſticle would have been allowed to remain expoſed to the irritation produced by the cord, which in all probability would have induced very troubleſome and even alarming ſymptoms; for we know that every ſymptom of a ſcirrhous or cancerous tumor is uniformly rendered worſe by irritation.

It has been alleged, that the real ſtate of the teſtis may be always known, by drawing the water off from the tunica vaginalis by a trocar; and this has accordingly been recommended as a previous ſtep to the introduction of the ſeton, with a view to aſcertain the ſituation the teſticle is in: But it often occurs, even after all the water is drawn off, that the thickneſs produced by the vaginal coat and ſcrotum, collapſing in large folds about the teſtis, precludes effectually every accurate examination of this kind.

We obſerved above too, that when the ſeton is uſed, the nature of the contents of the vaginal coat cannot be aſcertained. It frequently happens, that the water of a hydrocele is contained in a number of hydatids; a circumſtance which cannot be aſcertained previous to the opening of theſe ſwellings: And as it will be readily admitted that the method of cure by ſeton is ill ſuited for evacuating hydatids, this of itſelf is a very material objection to the practice. So that, upon the whole, although the ſeton in every other reſpect ſhould be equally eligible with the ſimple inciſion, which for the reaſons formerly given I think it is not, yet the two laſt objections we have adduced againſt it are ſufficient reaſons for ſetting it entirely aſide.

With reſpect to the mode by cauſtic, I have only to obſerve, in addition to what we already ſaid upon this ſubject, that where patients are naturally timid, and do not incline to ſubmit to the operation by the knife, this will in general be preferable.

But the treatment by cauſtic is liable to one very material objection, which never attends the cure by inciſion, *viz.* that of being productive of ſinuſes and collections of matter, in the ſcrotum and cellular ſubſtance connecting that bag to the tunica vaginalis. One inſtance of this I have ſeen, where it was neceſſary to evacuate different collections of matter by different openings; and a remarkable caſe of this kind is related by Douglas, where an extenſive inciſion was neceſſary for removing the ſymptoms which occurred*. For this reaſon therefore, and as the mode by inciſion brings the ſtate of the teſticle more evidently into view; and eſpecially as, from all the experience I have had of the two different methods of cure, that by inciſion ſeems in general to be productive of the leaſt troubleſome ſymptoms, I am therefore clear that it ought to be preferred.

In different publications we read of many dreadful ſymptoms induced by this operation for the hydrocele; but the ſame objections have been adduced againſt every mode of operating hitherto propoſed, and the

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* *Loc. cit.* p. 105.

ſame will ſtill be continued by ſuch as judge from partial information. In old, infirm, or diſeaſed conſtitutions, this and every other mode of operating will on ſome occaſions be productive of troubleſome and perhaps fatal conſequences: On the contrary, all the three methods of cure we have been treating of, *viz.* thoſe by cauſtic, the ſeton, and ſimple inciſion, will in general be found to anſwer the purpoſe very effectually of producing a radical cure of the diſorder. What I have been here endeavouring to ſhow, and what the importance of the ſubject makes me again repeat, is, that this end will commonly be obtained with more eaſe both to the operator and patient by the ſimple inciſion than by any other means.

In a matter of this kind no perſon ought to form an opinion haſtily. Nothing, but a variety of opportunities of putting the different operations in practice, can enable any practitioner to judge with propriety of the merits of each. In the writings of the late celebrated Mr Sharpe, we have a very remarkable inſtance of this. In his treatiſe on the Operations of Surgery*, he ſpeaks of the treatment of hydrocele by inciſion as a very dangerous operation, and thinks that it will probably be diſcarded altogether.

At that time, it is evident, Mr Sharpe's experience in this diſorder had not been ſufficient for warranting ſuch a deciſive opinion. It proved to be very contrary to the direct experience of ſome of our beſt ſurgeons; and Mr Sharpe himſelf ſeems afterwards to be convinced of his firſt ideas reſpecting this operation having been very ill founded †.

I will not poſitively ſay, that the experience of another practitioner may not lead him to make a different concluſion reſpecting the ſucceſs of theſe three modes of operating. Conſequences which I have not met with, may follow each of theſe methods. My opinion is chiefly founded on my own obſervation; and as the opportunities I have had of treating this diſorder, and of being concerned with others in the management of it, in all the variety of ways we have mentioned, have been frequent and ample, I have delivered it without any kind of difficulty.

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* Tenth Edition, Chap. IX.

† *Vide* Critical Inquiry, Firſt Edition, p. 86.

To thoſe who are not thoroughly acquainted with the importance of the ſubject, it may perhaps appear that it has been here treated with more minuteneſs than is neceſſary; but I know I ſhall not be conſidered as blameable in this particular by practitioners of experience.

We now proceed to conſider the third ſpecies of ſcrotal hydrocele, *viz.* that ſpecies of the diſorder in which the water is collected in the cavity of a hernial ſac.

SECTION IV.

Of the Hydrocele of a Hernial Sac.

IN every ſpecies of hernia, when the parts have been long protruded, a quantity of a ſerous fluid collects in the bottom of the ſac; and if any obſtacle occurs to the abſorption of this, if the diſorder is ſeated in the ſcrotum, we can eaſily conceive the poſſibility of the tumor augmenting to ſuch a ſize as to afford all the uſual marks of a hydrocele: And accordingly, on conſulting the various authors who have wrote upon hernia and hydrocele, we find a number of caſes enumerated, which ſufficiently warrant the inſertion of this as a real, and perhaps not an unfrequent, variety of the diſorder.

It was well known to the ancients, that a conſiderable quantity of fluid is frequently contained in the ſac of a hernia, along with the parts protruded from the abdomen; but *Saviard* ſeems to have been the firſt who entered into a particular conſideration of this occurrence. Le Dran relates different caſes of it: Heiſter ſpeaks of it under the title of Hydro-enterocele: And the late Dr Monro deſcribes it with his uſual accuracy, and mentions a caſe of this kind where ſix pounds of water was evacuated from the tumor by an opening made with the trocar [*]. A caſe of it is alſo related by Douglas [†], and two caſes of a ſimilar nature are mentioned by Mr Pott [‡].

The water being in this diſorder confined in a cyſt formed by a proceſs of the peritonæum, and as it occupies nearly the ſame ſituation in the ſcrotum with the hydrocele of the tunica vaginalis; ſo we cannot, by the feel alone, on every occaſion mark the difference between them. For although the teſticle in this ſpecies of hydrocele is commonly diſtinguiſhed more evidently at the lower and back part of the ſwelling than in the hydrocele of the vaginal coat, yet the difference in this particular between the two diſeaſes is not always ſo evident as to prove a ſufficient mark of diſtinction.

When a portion of gut and other parts forming the hernia are down, the fulneſs they produce along the ſpermatic cord, ſerves in ſome meaſure to diſtinguiſh the diſorder from a ſimple hydrocele. And when, along with this and other ſymptoms of hernia, we evidently diſcover in the tumor of the ſcrotum a fluctuation of a fluid, and if this fluid can by preſſure be made to diſappear either entirely or in part, the nature of the diſorder is thereby rendered ſufficiently obvious.

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[*] Monro's Works, p. 579. [†] *Loc. cit.* p. 182.

[‡] Treatiſe on the Hydrocele, p. 21.

This ſpecies of hydrocele may occur as readily in the hernia congenita, as in any other variety of rupture; and in that event, the water muſt for certain be contained in the ſame ſac both with the teſticle and protruded inteſtines. Indeed, as all the fluid naturally ſecreted for keeping the ſurface of the different abdominal viſcera moiſt, muſt in the caſe of a congenital rupture fall into the hernial ſac, we would thereby be induced to ſuppoſe that almoſt every caſe of this kind of hernia ought to be complicated with the diſorder we are now deſcribing. Both caſes of this ſpecies of hydrocele as related by Mr Pott, we find to have been connected with hernia congenita, and I have myſelf ſeen two inſtances of the ſame kind. But whether this commonly happens or not, farther obſervation will diſcover.

Whatever ſpecies of hernia this kind of hydrocele is connected with, if the water can by preſſure be made to paſs into the abdomen, this will always prove a certain characteriſtic of the diſeaſe; for in no other ſpecies of encyſted hydrocele is it poſſible to make the water diſappear by preſſure. It may happen, however, in this kind of hydrocele, that this diſtinguiſhing ſymptom of the diſeaſe does not exiſt; for if by the preſſure of a truſs, or from any other cauſe, an adheſion is produced in the groin between the ſides of the hernial ſac, if the under part of the ſac continues open with water collected in it, the tumor which it occaſions will afford all the uſual appearances of hydrocele, while no parts of its contents can be made to paſs into the addomen by preſſure: And a caſe of this kind we find related by Le Dran, where the neck of the hernial ſac was ſhut completely, and a hydrocele formed in the under part of it.

In ſuch a caſe, the only means of diſtinction will be, an acquaintance with the previous hiſtory of the diſorder. Whenever in an ambiguous caſe of this kind it is found, that, before the water began to collect in the ſcrotum, the patient had been liable to a hernia of the ſame ſide, this circumſtance alone will tend much to determine the nature of the diſeaſe. But even although a miſtake ſhould occur here, and this ſpecies of hydrocele ſhould be conſidered by a practitioner as a ſimple hydrocele of the tunica vaginalis, nothing bad could be produced by it; for the treatment adapted to one ſpecies of the diſeaſe, would apply with nearly equal propriety to the other.

But when the protruded parts ſtill remain down, unleſs the operation for the bubonocele is at the ſame time ſubmitted to, no other operation ſhould be attempted than that of diſcharging the water by a puncture with a ſmall trocar, when the ſize of the tumor renders ſuch a ſtep neceſſary. For unleſs the operation for the hernia was intended at the ſame time, much miſchief might be the conſequence, of expoſing the bowels to the external air, by laying the tumor open for a radical cure of the hydrocele.

Whenever in this ſpecies of hydrocele it is reſolved to have recourſe to the radical cure, the ſimple inciſion ought unqueſtionably to be employed; as from the riſk of injuring the bowels or other parts protruded from the abdomen, neither the ſeton or cauſtic are here admiſſible. Indeed this conſideration of itſelf affords a very ſtrong argument in favour of the method of treating hydrocele by inciſion, which lays all the parts concerned in the diſorder open to view: The very poſſibility of a patient being killed by a ſeton paſſing through a portion of inteſtine contained in a hydrocele, is a weighty objection againſt the ſeton being ever uſed; and every practitioner muſt acknowledge, that when the ſpermatic proceſs along the groin is much diſtended, and when the vaginal coat of the teſtis is much thickened, ſuch uncertainty often occurs as to render it impoſſible for the moſt ſkilful ſurgeons to determine with preciſion what the contents of ſuch ſwellings really are. In the two inſtances above alluded to, of hydrocele connected with a congenital hernia, and which I met with ſome years ago, there had not been previouſly in either of them any cauſe to ſuſpect the real nature of the caſe. They were both by ſkilful practitioners taken to be collections of water in the tunica vaginalis without any complication whatever; and in each of them, on the tumor being laid open, together with water in contact with the teſticle, a piece of inteſtine was found protruded into the upper part of the ſcrotum: In one of the caſes, too, a ſmall portion of omentum accompanied the gut.

In this laſt, it was propoſed, at a conſultation of different ſurgeons, to employ the ſeton. For ſome reaſon or other, this was fortunately rejected; for, on laying the tumor open by inciſion it evidently appeared, that if a cord had been introduced, it muſt in all probability have paſſed through the protruded gut. The mere poſſibility, therefore, of ſuch an occurrence, I would conſider as a very material objection to the method of treating any caſe of encyſted hydrocele by the ſeton.

SECTION V.

Of the Anaſarcous Hydrocele of the Spermatic Cord.

IN the anatomical deſcription we gave of theſe parts, it was obſerved, that, ſoon after the deſcent of the teſtes, the paſſage along the ſpermatic proceſs of the peritonæum is completely obliterated, by the ſides of the paſſage adhering to one another through the intervention of cellular ſubſtance.

By external preſſure, and perhaps from other cauſes, this adheſion of the ſides of the peritonæal proceſs in general is very firm in that part of it which paſſes along the groin; but the ſuperior and more internal parts of the proceſs, is not only more looſe in itſelf, but is connected with and enveloped in a very looſe cellular ſubſtance.

From this cellular ſtructure of theſe parts we might *à priori* ſuppoſe them to be liable to œdematous ſwellings, which other parts of the body of a ſimilar ſtructure are frequently attacked with: And accordingly, we find this proceſs of the peritonæum, liable to partake of every anaſarcous ſwelling with which the reſt of the body is attacked; it ſometimes accompanies aſcites; and it now and then appears as a local diſorder, without being combined with either of theſe.

The cauſes of this diſorder in general are, obſtructions produced upon the lymphatics of the part, by ſcirrhous affections of the liver, ſpleen, and other abdominal viſcera: I have likewiſe known it produced by the preſſure of a truſs applied for the cure of a hernia[*].

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[*] An inſtance of this kind is alſo mentioned by Douglas. *Treatiſe on the Hydrocele.*

When a ſwelling of this kind is connected with a general anaſarcous affection, the nature of the diſorder is then ſo diſtinctly marked as to render a particular deſcription of it altogether unneceſſary. When it occurs as a local diſeaſe, its appearances are theſe: A colourleſs tumor in the courſe of the ſpermatic cord; ſoft and inelaſtic to the feel, and not attended with fluctuation. In an erect poſture, it is of an oblong figure; but in a recumbent poſture of the body, it becomes more flat, and ſomewhat round. It does not *commonly* occupy more than the uſual ſtretch of the cord along the groin; but on *ſome occaſions*, it extends down the length of the teſticle, and even ſtretches the ſcrotum to an enormous ſize*. By preſſure the ſwelling can be always made to recede, if not entirely, at leaſt in great part, into the cavity of the abdomen; but it inſtantly returns to occupy its former ſituation on the preſſure being withdrawn.

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* A remakable inſtance of this is related by Mr Pott, who from a ſwelling of this kind diſcharged eleven Engliſh pints at once. *Treatiſe on the Hydrocele*, Caſe X.

When a tumor of this kind depends upon a general anaſarcous ſwelling of the body, unleſs the cauſe which gave riſe to the original diſeaſe of the conſtitution be removed, it would be a vain attempt to endeavour to cure this particular ſymptom; and it commonly happens, that theſe ſwellings in the groin which occur in the anaſarca, diſappear, on the diſeaſe of the ſyſtem at large being carried off.

But when a ſwelling of this nature occurs as an original diſorder; produced perhaps by ſome local cauſe; a local remedy is then the only means neceſſary to be employed. In ſuch a caſe, as we have not the general bad habit of body to encounter, which commonly occurs in caſes of ſcrotal anaſarca, we need not be ſo much afraid of making a free large inciſion into the tumor; and accordingly all that is neceſſary to be done here, is this: So ſoon as the ſwelling has acquired ſuch a ſize as to become inconvenient, an inciſion ſhould be made with a ſcalpel from one extremity of the tumor to the other, taking care to go ſo deep as effectually to evacuate all the water contained in the cells of the part; and as the water is now and then found to have acquired a viſcid conſiſtence, this circumſtance renders a deep inciſion more neceſſary than it otherwiſe would be.

The contents of the ſwelling being all removed, the ſore ſhould be gently ſtuffed with ſoft charpee; and muſt afterwards be treated in every reſpect as a ſimple wound from any other cauſe; by poultices and fomentations if much pain and a ſcanty ſuppuration render theſe remedies neceſſary; and by proper attention to dreſſing in ſuch a way as to induce a ſufficient degree of firmneſs from the bottom of the ſore.

SECTION VI.

Of the Encyſted Hydrocele of the Spermatic Cord.

THE ſurrounding ſubſtance of the ſpermatic cord being altogether cellular, the formation of encyſted tumors we may conclude ought here to be as frequent as in other parts of the body; and accordingly we find in ſome inſtances, that water, inſtead of diffuſing itſelf over the whole ſpermatic proceſs, is collected into one or more diſtinct cells or cyſts.

On the firſt approach of a tumor of this kind, by being at that time very ſmall it gives little or no trouble, and is therefore ſeldom much noticed till it has acquired a larger ſize. On ſome occaſions, the ſwelling begins in the ſuperior part of the proceſs; but in general, it is firſt obſerved towards its lower extremity a little above the epididymis. By degrees, however, it ſtretches upwards, and on ſome occaſions ſo far downwards as to reach from the abdominal muſcles to the very bottom of the ſcrotum; in which caſe, a perſon not verſant in diſorders of this nature, may very probably miſtake this ſpecies of hydrocele, for a collection in the tunica vaginalis teſtis: But we have here a very characteriſtic diſtinction between the two diſeaſes. In the commencement of this ſpecies of ſwelling, the tumor is always above the teſticle, which is diſtinctly felt below it; and even in the moſt advanced ſtages of the diſorder, the teſtis is found lying at the back part of it, perfectly unconnected with the ſwelling: Whereas, in the advanced ſtate of a hydrocele of the tunica vaginalis, altho' ſome degree of hardneſs is always diſcovered at that part where the tunica vaginalis adheres to the teſticle; yet in the latter period of that diſorder, when the ſwelling is conſiderable, the teſtis itſelf can never be diſtinctly felt. In the ſpecies of hydrocele we are now deſcribing, the figure and ſize of the penis is not commonly ſo much altered, as when the water is collected in the tunica vaginalis, when the penis is frequently made to diſappear almoſt entirely.

In other particulars, the encyſted dropſy of the ſpermatic cord is very ſimilar to the hydrocele of the tunica vaginalis teſtis. A fluctuation of a fluid is evidently diſcovered on preſſure: The tumor is commonly of a pyramidal form, as is generally too the caſe with the other, with its baſe or largeſt extremity downwards[*]: And no preſſure has any influence in making it diſappear either altogether or in part.

This is the appearance of the diſorder when the water is contained in one cyſt; when it is ſeparated into two diſtinct cells, the line of diviſion is commonly evident, by the tumor being at that part ſomewhat puckered, or ſometimes a little diminiſhed in its diameter. A ſimilar appearance, we may obſerve too, takes place when this ſpecies of ſwelling is combined with a real hydrocele of the tunica vaginalis teſtis, which on ſome occaſions it is: And in that caſe, a line of ſeparation is obſerved at that part where the upper extremity of the tunica vaginalis terminates.

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[*] A hydrocele of the tunica vaginalis teſtis is ſo frequently of a pyramidal form, with its baſe downwards, that this ſhape may be conſidered as one of the characteriſtic appearances of the diſeaſe; every other tumor to which the teſtis and its coats are liable, being either more round, or of a more irregular ſhape.

We have already mentioned the means of diſtinction between this ſpecies of hydrocele and that of the vaginal coat of the teſtis. The only other affections with which it is in danger of being confounded, is the anaſarcous hydrocele of the ſpermatic cord; and a real hernia, either of the omentum, or of a portion of gut. From the former, however, as alſo from an omental hernia, it may in general be diſtinguiſhed by the feel. In neither of theſe is there the leaſt ſenſation of the fluctuation of a fluid, and to the touch they are both ſoft and inelaſtic; whereas, in this ſpecies of hydrocele, the tumor has a ſpringy kind of feel, and a fluctuation is evidently found in it. And in both the others, the ſwelling recedes more or leſs upon preſſure, which it never does in this ſpecies of encyſted hydrocele.

From a gut rupture it is chiefly diſtinguiſhed by the tumor beginning, not at the ring in the external oblique muſcle, as is the caſe in hernia, but farther down the cord: In the latter, too, the ſwelling commonly turns leſs on the patient getting into a horizontal poſture; and it is always conſiderably affected both by coughing and ſneezing; but no poſture, no preſſure, or any accident whatever, alters the ſize of this variety of hydrocele. The abſence of other ſymptoms of hernia, too, is here material in the diſtinction: For there is neither pain in the tumor, nor in the abdomen; nor ſickneſs, vomiting, or any interruption to the paſſage by ſtool, as there very commonly are in hernia.

Although all the ancient writers were quite unacquainted with the anatomy of the parts concerned in this diſorder, it is evident, they were well aware of its exſtience. We find it particularly deſcribed by *Ægineta*, *Albucaſis*, and afterwards by Fallopius, Wiſeman, &c. Arnaud, in his treatiſe on hernia, alſo takes notice of it, tho' not with much accuracy; and we find it more lately deſcribed with exactneſs, by the late Doctor Monro, by Douglas, and by Mr Pott.

This ſpecies of hydrocele, as alſo the anaſarcous ſwelling of the cord, and the œdematous tumor of the ſcrotum, are all very frequent in infancy. In that tender age, however, they generally ſoon diſſipate, and in this they are much aſſiſted by the application of cloths dipped in ſpirit of wine; and I have ſeen much advantage produced by an application of a ſtrong infuſion of red-roſe leaves, combined with a conſiderable proportion of alum. Monro adviſes the application of cloths warmed with the fumes of burning benzoin.

But in adults, the cyſt confining the water generally becomes ſo firm as not to be affected by any of theſe remedies. So that when it arrives at any conſiderable ſize, which it frequently does, either the means for the palliative or radical cure may be employed, as was recommended in the hydrocele of the tunica vaginalis teſtis.

When it is intended merely to evacuate the water by puncture, it is to be done with a trocar, in the ſame manner as was directed for a hydrocele of the tunica vaginalis;

ginalis; taking care to introduce the inſtrument at the moſt depending part of the tumor. And again, when it is intended to effect a radical cure, the ſame means are to be employed which we formerly recommended in the other ſpecies of the diſeaſe. There do not here, indeed, occur the ſame objections to the uſe of the ſeton, as in the hydrocele of the tunica vaginalis, from the preſence of the teſticle: And if we could in every ſpecies of hydrocele aſcertain with certainty the exact contents of the tumor, the ſeton might no doubt be employed here with ſafety and advantage: But as it is clear from what we have already ſaid upon this point, that no certainty of this kind can be obtained; and as a hydrocele of a hernial ſac in which a portion of gut is contained, may be as readily confounded with this as with any other ſpecies of the diſeaſe; I would therefore without heſitation lay this method of cure entirely aſide.

A material objection occurs here to the method of cure by *cauſtic* in this ſpecies of hydrocele, which is not applicable in the hydrocele of the tunica vaginalis, viz. the water being in ſome inſtances of this diſorder collected in two or more diſtinct cyſts; different caſes of which I have met with, and ſimilar occurrences are related both by Garengeot and Douglas.—Now, in ſuch an event, if cauſtic ſhould be applied in the method recommended by Mr Elſe, upon a ſmall ſpot only, all the water would not be evacuated; and in order to obtain a complete removal of the diſorder, it would be neceſſary to repeat the application of the cauſtic.

This, I think, is an additional reaſon for employing in all ſuch inſtances the method of cure by inciſion; which, by laying the tumor open from one end to the other, divides at once all the different cyſts of which it may be compoſed, and ſaves the patient from that diſtreſs and diſappointment which muſt always be experienced, on a complete cure not being obtained when good reaſons had been given for expecting it. We would therefore adviſe the treatment by inciſion in this ſpecies of hydrocele, in the ſame manner as was recommended in the hydrocele of the tunica vaginalis; the mode of performing the operation, and the after-treatment of the patient, being nearly the ſame in each.

We have thus enumerated all the kinds of hydrocele which can properly be conſidered as forming diſtinct varieties of the diſorder. In doing ſo, as no diſeaſe is deſcribed but ſuch as every practitioner of experience muſt have met with, and of which the ſymptoms are clearly and diſtinctly marked; ſo it will not, I hope, be conſidered as an unneceſſary degree of minuteneſs their being all particularly taken notice of. —I cannot well comprehend what is meant by ſome authors, particularly Mr Sharpe [*] and Mr Elſe [†], who think it might be better to confine the deſcription of this diſorder to two ſpecies.

We need not wonder at Mr Sharpe ſpeaking in this manner: For, even at the late period in which he wrote, although the exiſtence of all the varieties of the diſeaſe we have mentioned had been aſcertained by different authors, yet they were not till of late years underſtood with much accuracy; and it is very evident from Mr Sharpe's writings on this ſubject, that his ideas of theſe diſorders were in many reſpects more confuſed than could have been expected in one of his uſual accuracy and penetration. But whatever was the caſe with Mr Sharpe, it is truly ſurpriſing, that thoſe who are unqueſtionably well informed in every circumſtance relating to this diſorder, and who muſt be convinced, from their acquaintance with diſſection, of the exiſtence of all the varieties of the diſeaſe that have been mentioned, ſhould object to their being retained. Where no evident or marked diſtinction occurs between one tumor and another, an attempt to eſtabliſh a difference would be uſeleſs, and therefore improper; but where appearances point out an obvious variety, it would ſurely be conſidered as an unpardonable neglect in an author to omit the detail of them.

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[*] Treatiſe on the Operations of Surgery.

[†] Loco citato.

In our deſcription of the five different ſpecies of hydrocele, viz. the anaſarcous ſwelling of the ſcrotum; the hydrocele of the tunica vaginalis teſtis; the hydrocele of the hernial ſac; the anaſarcous ſwelling of the ſpermatic cord; and the encyſted collection in that part; it was neceſſary in going along to enumerate the ſymptoms of each as they occur ſeparately and uncombined. It ſometimes happens, however, that one, two, or more of the different ſpecies occur at the ſame time in the ſame patient: On ſome occaſions I have met with three, and not unfrequently with two, varieties in the ſame perſon: Monro mentions an inſtance of four ſpecies of hydrocele being all combined in one caſe *.

In ſuch occurrences ſome difficulty and confuſion is, no doubt, to be expected; but practitioners, in forming a judgment of their nature, muſt be entirely directed by a

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* See his Works, p. 576.

a due attention to the various ſymptoms which uſually occur in a *ſeparate ſtate* in each variety of the diſeaſe.

We now procced to the conſideration of the other varieties of falſe hernia; and firſt of the *Hæmatocele.*

CHAP. VII.

Of the HÆMATOCELE.

THE *Hæmatocele* is a tumor in the ſcrotum or ſpermatic cord, produced by *extravaſated* blood.

The uſual ſeat of ſuch tumors is in the tunica vaginalis of the teſtis; but on ſome occaſions they are ſeated in the ſpermatic proceſs; and now and then they are met with in the dartos.

Tumors of this kind are in general produced by the rupture of one or more blood-veſſels, in conſequence of external violence. Blows upon the ſcrotum have produced ruptures of veins, not only in the cellular ſubſtance of the ſcrotum, but in the vaginal coat of the teſticle; and accidents of a ſimilar nature have produced ſimilar affections in the courſe of the ſpermatic cord: And as the parts in this ſituation are very lax and cellular, the rupture either of an artery, or of a vein of any conſiderable ſize, is here always ſure of producing a plentiful extravaſation of their contents.

In the *tunica vaginalis teſtis*, this diſorder is frequently induced by the point of a trocar or of a lancet in tapping for a hydrocele, wounding ſome of the blood-veſſels of the ſac, which in ſuch caſes are always much enlarged. In ſuch an occurrence, we are commonly rendered certain of what has happened, by the water drawn off being ſuddenly tinged with blood; but on other occaſions it does not appear till the water is all evacuated, and then a tumor of a conſiderable ſize is frequently produced in the courſe of a very ſhort ſpace of time.

In ſome of theſe caſes, where the bulk of water has been remarkable, the ſudden diſcharge of it, by taking away the ſupport which the veſſels of the part have been for ſome time accuſtomed to receive from it, has undoubtedly been the cauſe of the rupture of ſome of them; and from repeated obſervation I think it may be conſidered as a certainty, whenever a tumor is produced either in the ſcrotum or ſpermatic cord, ſuddenly after the water of a hydrocele has been evacuated by tapping, that it is entirely the conſequence of an extravaſation of *blood;* for collections of water are never known to arrive ſo quickly at a conſiderable ſize.

In the ſpermatic proceſs, injuries of the ſame kind will be attended with a ſimilar effect upon the ſmaller veins of the ſac containing the water; and violence of more importance, has on ſome occaſions produced a rupture of the ſpermatic artery and vein.

But, in whatever way the tumor has been produced, the appearances are nearly ſimilar to thoſe of watery collections in the ſame parts, ſo that we do not conſider it as neceſſary to repeat them here: Only it may be obſerved, that when blood is extravaſated in the ſcrotum, it is eaſily diſcovered from a collection of water by the colour, it being in every reſpect a real *Ecchymoſis.* When the ſwelling is ſeated in the tunica vaginalis, the means of diſtinguiſhing between blood and water, is, that a tumor produced by the former, feels to be more heavy than water in proportion to its bulk; and they who are much accuſtomed to handle ſuch diſorders, are on many occaſions ſenſible of a difference of conſiſtence.

The treatment here is nearly the ſame as we have already recommended in caſes of hydrocele. In the commencement of the *anaſarcous* or diffuſed ſpecies of hæmatocele, when produced by a ſlight external violence, whether in the ſcrotum or ſpermatic proceſs, the application of ardent ſpirits, or of a ſolution of alum, will on ſome occaſions effect its diſcuſſion: But when this, upon trial, is not found to ſucceed, the tumor is to be laid open, and in every reſpect treated in the ſame manner as was directed for hydrocele; only, if a ruptured blood-veſſel is detected, the only effectual means of preventing a return of the diſorder is to ſecure it by ligature.

In the ſame manner, all collections of blood, either in the vaginal coat of the teſtis, or in the cyſt of a former hydrocele of the ſpermatic cord, are to be laid open by an inciſion extending the whole length of the tumor, and are to be treated as we formerly directed for hydrocele. And, as we have already adviſed in the diffuſed ſpecies of *hæmatocele*, if any ruptured veſſel comes into view in the courſe of the operation, it ought to be immediately ſecured by ligature. It ſometimes happens, however, in affections of this kind, both of the *ſpermatic proceſs* and *tunica vaginalis teſtis*, that the veſſels from whence the blood is diſcharged cannot be detected; a very conſiderable oozing continuing from day to day, notwithſtanding the uſe of bark, vitriolic acid, and every other means commonly employed in ſuch caſes.

If, after a proper trial of all the ordinary remedies uſed in caſes of hæmorrhagies, and if the veſſels from whence the blood is diſcharged cannot be otherwiſe ſecured, it may frequently be effected by extirpation of the teſticle; which, in ſuch occurrences, is the only remedy that can be put in practice from which any advantage is to be expected.

Another ſpecies of hæmatocele has been mentioned by Mr Pott, in which the blood is contained within the tunica albuginea of the teſtis. It proceeds, he thinks, from a relaxation or diſſolution of part of the vaſcular ſtructure of the teſticle; and when the quantity of blood collected is conſiderable, it produces, Mr Pott remarks, a fluctuation ſomewhat like to that of an hydrocele of the tunica vaginalis.

When this happens to be miſtaken for

a hydrocele, as it has ſometimes been, and an opening with a trocar is made into it, a diſcharge is produced, of a dark, duſky-coloured blood, nearly of the conſiſtence of thin chocolate ; and although ſome diminution may be made in the ſize of the tumor, by the evacuation thus obtained, yet no conſiderable alteration is effected by it.

Any perforation that is made into it, of courſe does no good; and as the teſticle is commonly ſo far ſpoiled by the diſeaſe as to be rendered quite uſeleſs, caſtration is adviſed as the only effectual remedy *.

I have different times met with a diſeaſe very ſimilar to this deſcribed by Mr Pott: But as the blood in ſuch inſtances did not appear to be extravaſated, but to be ſtill contained in the veſſels of the teſtis in an enlarged varicoſe ſtate, I would not incline, therefore, to refer this kind of tumor to any ſpecies of hæmatocele. I have even ſeen this diſorder miſtaken for a hydrocele, and treated as ſuch, by a trocar being plunged

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* Mr Potts Treatiſe on the Hydrocele.

plunged into it, when the effects were juſt ſuch as are deſcribed by Mr Pott. But, if the blood had been extravaſated, more of it ought to have been diſcharged by the operation than was ever poſſible to effect: Even where the tumor has been of a conſiderable ſize, it has not been found poſſible to evacuate in this manner more than a ſpoonful or two of blood; and although in ſuch caſes the blood appears evidently to be thicker than it ought to be, yet it is by no means ſo much ſo as ſhould prevent it from being freely diſcharged by the canula of a trocar if it was contained in a ſtate of extravaſation. But, in all the inſtances I ever met with of this diſorder, the blood appeared to be ſtill contained within its proper veſſels in an enlarged varicoſe ſtate; ſo that, inſtead of conſidering ſuch a tumor as a variety of hæmatocele, I would rather refer it to a ſpecies of Varix.

In any caſes of this kind that I have met with, when the tumors have not been opened, but have been entirely truſted to the ſupport afforded by a ſuſpenſory, I have known them remain for many years without being productive of any miſchief: And they are attended with this peculiarity, that when effectually ſupported by a bandage, they remain ſtationary for a great length of time, without acquiring any additional ſize; an occurrence which no ſupport will prevent either in hydrocele or in the real hæmatocele. But ſo ſoon as the tumor, by being miſtaken for a hydrocele, is touched with an inſtrument with a view to evacuate its contents, it is from that moment ſure to go wrong. The patient, from being previouſly liable to little or no pain, immediately on the tumor being opened becomes very much diſtreſſed; the ſwelling then begins to increaſe, and in a gradual manner to prove ſo troubleſome by frequent diſcharges of blood, as to render caſtration abſolutely neceſſary.

Even this diſagreeable reſource does not always prove a certain relief; for it ſometimes happens, that ſuch a ſpungy relaxed ſtate of the veſſels occurs along the whole courſe of the cord, that although they are ſecured by ligature to-day, the blood burſts out from different parts of the ſore to-morrow. I happened once to be concerned in a very melancholy inſtance of this kind: After the uſual operation of caſtration, freſh hæmorrhagies occurred at every dreſſing; the veſſels were at different times ſecured by ligature, but to no purpoſe; the blood burſt out again and again, and the patient, after ſuffering much diſtreſs, at laſt died.

The only difference which, before laying the parts open, can be obſerved between this ſpecies of tumor, and a real hydrocele of the tunica vaginalis, is, that in this, the fluctuation in the ſwelling is never ſo evident as in the other; the tumor is heavy in proportion to its ſize; and if properly ſupported by a bandage, it does not receive any additional increaſe. Whenever theſe circumſtances, therefore, occur in the ſame caſe, it ought to afford much reaſon to ſuſpect that the ſwelling is of this nature, and that accordingly it ought not to be meddled with.

As I conſider this diſorder to be entirely of the varicoſe kind, I would not have thought of introducing the conſideration of it here; but as it was proper to mention its having been taken notice of by others as a ſpecies of hæmatocele, I thought it better to finiſh the diſcuſſion of it at once, than to be under the neceſſity of bringing it in again in a ſubſequent chapter.

CHAP. VIII.

Of the VARICOCELE, CIRSOCELE, SPERMATOCELE, *and* PNEUMATOCELE.

BY the firſt of theſe terms is meant, a varicoſe diſtenſion of the veins of the ſcrotum; which in this ſtate form a tumor of hard knotty inequalities, ſeldom attended with pain, and in general productive of no inconvenience except what ariſes from its bulk.

The *Cirſocele* is a tumor of a nature ſimilar to the former, in the courſe of the ſpermatic cord, extending from the ſuperior part of the ſcrotum to the abdominal muſcles, and produced by a varicoſe diſtenſion of the ſpermatic vein.

Both theſe affections are now and then produced, by obſtruction of one kind or another in the courſe of the refluent veins of theſe parts: but moſt frequently they depend on a debilitated relaxed ſtate of the veins themſelves.

When tumors in the courſe of the veins are detected as the cauſe of ſuch ſwellings, or when the preſſure of a hernial truſs upon the ſpermatic proceſs is diſcovered to be their origin; the removal of this evident cauſe of the diſeaſe, ought to be the firſt attempt towards a cure.

If the preſſure of a truſs has been the cauſe of the ſwelling, an alteration in the bandage, may probably anſwer the purpoſe.

poſe. If tumors of a hard ſcirrhous nature, have produced it, their extirpation, when that is found to be practicable, will be the moſt effectual means that can be employed; and if the tumors have any tendency to ſuppurate, warm emollient applications will be more uſeful than any other remedy.

But when a general relaxed ſtate of the veins, is ſuſpected to give riſe to the complaint, ſuch remedies ought to be employed, as will moſt effectually recover that tone, of which the veins have been deprived by being long over-diſtended. For this purpoſe nothing commonly anſwers ſo well as the uſe of a proper ſuſpenſory bandage; a horizontal poſture; the cold bath; and the application of a ſolution of alum and other aſtringents, to the parts affected.

By a due continuation of theſe means every affection of this kind may be always prevented from increaſing, and will commonly be ſo far relieved as to render the harſh means by the knife, the cautery, and ligature, recommended by ancient writers for the removal of ſuch tumors, unneceſſary.

By the term *Spermatocele*, is meant, a morbid diſtenſion of the epididymis and vas deferens, produced by a ſtagnation of ſemen. This may be produced by *tumors*, *ſtricture*, or *inflammation*, about the *caput gallinaginis*, or in the courſe of the *vas deferens*; but there is reaſon to think, that it is more frequently induced by the laſt, viz. by inflammation, than by either of the other two.

When an inflammatory affection of the parts is diſcovered to be the cauſe of the diſeaſe, general and topical blood-letting, gentle laxatives, a low cooling diet, and reſt of body, will commonly be found the moſt effectual remedies. And again, when tumors are diſcovered to preſs upon the *vas deferens*, they ought either to be brought to ſuppurate, or their extirpation ſhould be attempted when that can be done with propriety. At other times, theſe tumors are found to depend on a venereal cauſe; and in ſuch inſtances a well-directed courſe of mercury has been known to remove them.

On ſome occaſions we are told, that all he other means having failed, *caſtration* has at laſt been found requiſite. This, however, we cannot ſuppoſe to be ever a very neceſſary meaſure.

The term *Pneumatocele*, is applied to ſignify a diſtenſion of the ſcrotum by a collection of air.

This has been deſcribed by moſt of the ancient writers as a very frequent occurrence; but there is much reaſon to think, that a great proportion of all the tumors they take notice of as containing *air*, were either formed by collections of water, or by a protruſion of ſome of the bowels. That ſpecies of hernia to which young children are liable, is to this day by our common people termed a Wind Rupture; as are all thoſe collections of water in the ſcrotum, with which new-born infants are affected: But we know well, that none of theſe tumors are formed merely by wind; their contents being of a very different nature.

In wounds of the lungs, air is ſometimes extravaſated into the ſurrounding cellular ſubſtance, and in that way paſſes into the ſcrotum, as it does in particular inſtances over the whole body: And in high degrees of putrid diſeaſes, ſo much air may be ſeparated from the blood, as to diſtend the cellular ſubſtance of the ſcrotum, as well as of other parts; but a real *pneumatocele* has never, probably, exiſted as a mere local affection of the ſcrotum.

In the caſe of air diffuſed into the cellular ſubſtance of theſe parts, in conſequence of a wound or any other affection of the lungs producing an extravaſation of it, the ſame method of cure will anſwer for its removal that we recommended for anaſarcous ſwellings formed by water, viz. ſmall punctures with the point of a lancet, which are found to be fully ſufficient for evacuating great quantities of air. But whenever the diſeaſe is induced by ſuch a great degree of putreſcency in the ſyſtem as is neceſſary for effecting a ſeparation of air from the blood, there can be little reaſon to expect any advantage to reſult from whatever means may be employed for relief.

CHAP IX.

Of the SARCOCELE, *or* SCIRRHOUS TESTICLE.

BY the term *Sarcocele*, is underſtood, a firm fleſhy kind of enlargement of the teſticle: A ſimple inflammatory affection of the teſtis affords a tumor of ſome degree of firmneſs; but the true ſarcocele, or ſcirrhous teſticle, is attended with a hardneſs never to be met with in the real hernia humoralis or inflamed teſticle.

A ſcirrhous teſticle, in the courſe of its progreſs puts on ſuch a variety of appearances, as renders it difficult by deſcription to give an adequate idea of it: In general, however, the acceſſion and progreſs of the diſeaſe is as follows.

An unuſual degree of hardneſs, attended with a trifling enlargement of the whole teſtis, proves in general to be the firſt indication of the diſeaſe: In the beginning, no diſcolouration is obſerved, nor is there any material pain: In a gradual manner the tumor acquires a larger ſize: As yet it remains ſmooth and equal on its ſurface; but with the ſize of the ſwelling, the hardneſs alſo becomes more remarkable: Slight pains are at times felt through the ſubſtance of the tumor; and if it is not ſuſpended, the patient complains of ſome uneaſineſs in his back.

When there is nothing particularly bad in the conſtitution, the diſorder will on ſome occaſions remain in this ſituation for a great length of time; and in a few inſtances, by a moderate diet, keeping an open belly, ſuſpending the tumor properly, and avoiding violent exerciſe, the diſorder has not only been prevented from increaſing, but has in a gradual manner diſſipated: Such favourable occurrences, however, it muſt be owned, are exceedingly rare; for the ſwelling, inſtead of diſcuſſing, or remaining ſtationary, in general proceeds with more or leſs rapidity to turn worſe. The tumor acquires a larger ſize; becomes ragged and unequal on its ſurface; and the pain, which at firſt was trifling, becomes more ſevere, darting in ſmart ſtings through the ſubſtance of the tumor.

The inequalities on the ſurface of the tumor by degrees increaſe, and continue to retain the ſame kind of hardneſs with the ſwelling from which they originate: On ſome occaſions, a conſiderable quantity of ſerum is extravaſated into the *tunica vaginalis*, which, to thoſe not acquainted with the nature of ſuch diſorders, gives the tumor the appearance of a common hydrocele: And at other times, inſtead of ſuch depoſitions into the vaginal coat, partial collections of matter are formed through the whole body of the tumor: Theſe by degrees increaſe; and the ſcrotum, which has hitherto been gradually diſtending, at laſt burſts, and a diſcharge takes place from the various collections in the body of the tumor, of a thin, fetid, bloody matter.

On ſome occaſions, the ſpermatic cord becomes hard and enlarged ſoon after the commencement of the diſeaſe; but in general the cord does not become affected till the tumor has acquired a conſiderable ſize, and moſt frequently, I have obſerved, not till matter has formed in ſome part or other of the ſwelling.

As the diſorder of the teſticle advances, this affection of the cord alſo becomes worſe: From being at firſt only ſlightly tumefied, it gradually turns more hard and ſwelled; it becomes very painful, and knotty or unequal along its whole courſe.

The diſcharge from the openings in the ſcrotum ſtill continues: But altho' the matter increaſes in quantity, the ſize of the tumor is not thereby diminiſhed; on the contrary, it ſtill continues to increaſe: The edges of the ſore become hard, livid, and retorted; and fungous excreſcences puſh out from different parts of it.

Whatever was the ſtate of the patient's conſtitution on the firſt attack of the diſeaſe, in this advanced ſtate of it, it is always greatly impaired: He is now become emaciated; of a pale, wan complexion; and the diſorder, which in this ſtage of it is a real cancer of the moſt malignant nature, turning ſtill more virulent, by the pain becoming more tormenting, the patient is at laſt carried off in very great miſery.

Such, in general, is the progreſs and event of this dreadful diſorder, if it is not interrupted by extirpation of the teſticle before the ſwelling has proceeded too far. We have already ſaid that it exhibits very great variety: The ſymptoms here enumerated are thoſe which occur moſt frequently; but no deſcription can convey a clear idea of all the variety of appearances it aſſumes. On ſome occaſions, we have already obſerved, it remains apparently in an indolent, inactive ſtate, for a great length of time, even for years; and in others it proceeds ſo rapidly, that in the ſpace of a few months it has been known to paſs through all the various changes we have enumerated.

In by much the greateſt proportion of ſuch affections, the diſorder begins in the body of the teſtis, affecting the whole of it equally; but it is now and then known to make its firſt appearance in the epididymis, and ſometimes even in the ſpermatic cord. It has been a prevailing opinion, indeed, that a ſcirrhous hardneſs tending to cancer, never does begin in the epididymis; but that the teſticle is always firſt affected. This is certainly the caſe in general; but every practitioner muſt at times have met with caſes of a real cancerous nature, beginning in the epididymis, and ſometimes even in the ſpermatic cord, and ſpreading from thence to the neighbouring parts.— I might here inſert different caſes of this nature, which have fallen within my own obſervation; but Mr Pott's collection furniſhes a ſufficient number of well-marked examples of the fact *.

In almoſt every caſe of ſwelled teſticle

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* Treatiſe on the Hydrocele, Caſes 42. 48. and 49.

from a gonorrhœa, the epididymis is not only affected before the teſticle, by the inflammation in ſuch caſes ſpreading from the urethra along the vas deferens, when of courſe it muſt firſt reach the epididymis; but the diſorder in ſuch caſes, when it begins to yield, always firſt removes from the teſticle, leaving in general a ſcirrhous hardneſs in the epididymis, which on ſome occaſions in the courſe of time diſſipates entirely, and in others remains of the ſame degree of hardneſs for a conſiderable time, and now and then even for life. But as the hardneſs produced in this manner is merely the conſequence of inflammation upon a membranous or vaſcular part; ſo here, as in other parts of the body of a ſimilar texture, we *ſeldom* find, that hardneſs thus induced terminates in any thing bad.

The contrary, however, of this has been too much inculcated. It has been ſaid, that the hernia humoralis produced by a venereal infection, is *a frequent cauſe* of the worſt kind of ſcirrhous teſticle; which, as the fact is very much otherwiſe, has this improper

proper tendency, that it prevents the uſe of, and a proper perſeverance in, ſuch courſes of medicine, as might, without the neceſſity of extirpation, have removed them: There having been inſtances of this idea being ſo improperly applied, as to be the means of different teſtes being extirpated, which were evidently diſeaſed from a venereal cauſe, and which by proper courſes of mercury might in all probability have been removed.

But although I have ſaid that affections of this nature, I mean ſwelled teſticles from a venereal cauſe, are very *ſeldom* known to end in any thing bad; yet I will not go ſo far as to ſay that they *never* do ſo: For I know, that a hardened ſtate of the teſtis and epididymis, produced originally by a venereal taint, does in ſome inſtances degenerate into the worſt ſpecies of ſarcocele; that is, that though affections of this kind do moſt frequently terminate eaſily, yet that now and then in particular conſtitutions, whoſe peculiarities, however, we are not acquainted with, they do certainly produce ſcirrhoſities of the very worſt kind, when ſuch ailments would never probably have appeared had the original venereal taint not occurred as an exciting cauſe of the diſorder. We know well, that a prediſpoſition to different diſorders will remain long in a latent ſtate in the ſyſtem, without being productive of any evident affection, till the application of ſome particular ſtimulus brings it into action: In the ſame manner, a venereal inflammatory affection of the teſtis, will in *ſome conſtitutions* terminate in much miſchief, altho' *in general* its effects in this way are by no means to be dreaded.

I have dwelt longer upon this point than I otherwiſe ſhould have done, from a contrary doctrine having been ſtrenuouſly inculcated by one whoſe authority is deſervedly great, and whoſe obſervation in this diſeaſe has led to the concluſion he endeavours to eſtabliſh *: But as all the experience I have had in theſe matters, has tended clearly to form the opinion here delivered,

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* Mr Pott, *Treatiſe on the Hydrocele*, &c. p. 232.

livered, I could not avoid ſtating it in the mannner I have done.

In the treatiſe alluded to, we are told, that a hernia humoralis is *never*, *in any one inſtance*, productive of this diſeaſe. If on this ſubject Mr Pott's idea is juſt, it ought undoubtedly to be received: But if it is not, it may very certainly do miſchief, by rendering both patients and practitioners more remiſs in caſes of ſarcocele proceeding from this cauſe than they otherwiſe would be; as, by continuing ſtill in hopes of a mercurial courſe being able to effect a cure, they may thereby allow the diſeaſe to go too far even for extirpation to be adviſeable.

In every doubtful caſe of this kind, a proper medium ought to be aimed at. Whenever a venereal infection is ſuſpected as the cauſe of a ſcirrhous teſticle, blood-letting when the patient's pulſe renders it neceſſary; an open belly; a cooling diet; a horizontal poſture; with a proper ſuſpenſory bandage; and a well-directed mercurial courſe, will very commonly remove the diſeaſe. But when in ſuch inſtances the means recommended are put in practice without any evident advantage; and eſpecially, if during their application, the diſorder, inſtead of getting better, turns gradually worſe; ſo ſoon as from its increaſe in ſize there appears to be any riſk of its advancing beyond the reach of operation, it ought then at all events to be extirpated, whatever the cauſe which originally produced it may have been.

Among other cauſes mentioned by authors as being productive of a ſcirrhous ſtate of the teſticles, is the hydrocele of the tunica vaginalis. From quantities of a watery fluid being frequently found in the vaginal coat of a ſcirrhous teſticle, it has been ſuppoſed, that the water in ſuch caſes was the original cauſe of the diſeaſe in the teſtis, and not the conſequence of it. There is every reaſon, however, to think, that in theſe collections of water in the vaginal coat, in which the teſtis is found diſeaſed, that the hardened ſtate of that organ ought to be conſidered as the *original diſorder*, and not the quantity of water which ſurrounds it *.

Collections of water are no doubt often met with, even in the real ſarcocele; but this ought to be conſidered only as a different ſtage of the ſame diſeaſe: For although the true ſcirrhous teſticle is never at firſt attended with any collection of this nature, it is natural to ſuppoſe, that a hard diſeaſed ſtate of that viſcus, muſt have ſome influence in producing an alteration in the quantity of fluid with which the tunica vaginalis is always provided in a ſound healthy ſtate. If it either effects an augmented ſecretion, or a diminiſhed abſorption of that fluid, a dropſical ſwelling muſt be the certain conſequence; and every ſuch collection, combined with a ſcirrhous teſticle, has been very properly termed a *hydro-ſarcocele*.

That the teſtis, by remaining long immerſed in the water even of a true hydrocele, does frequently become ſomewhat altered in its texture, there is no reaſon to doubt. Thus, as we have elſewhere obſerved, on laying open the tunica vaginalis, the teſtis in that diſorder, is always found to be of a more pale appearance than naturally it ought to be: On ſome occaſions it is very much diminiſhed, and on others conſiderably enlarged; but all ſuch enlargements, when connected with a real hydrocele, are of a ſoft harmleſs nature, ſuch as never give any pain, and in this ſtate the teſtis ought never to be extirpated.

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* Mr Pott is clearly of this opinion. *Loc. cit.*

This is a point, we may remark, which it is of ſome importance to aſcertain: For on the idea of theſe enlargements of the teſtes, frequently connected with, and perhaps produced by, the immerſion of theſe bodies in the water of a hydrocele, being of a real ſcirrhous nature; on laying open the tunica vaginalis, and finding them in that ſtate, their extirpation has been often adviſed, and unfortunately too often practiſed.

In circumſtances of this kind the means of diſtinction between the mild and malignant ſpecies of enlarged teſticle, by which we ſhould in general be directed, are the following.

When the body of the teſtis becomes hard and enlarged, previous to any collection of water in the tunica vaginalis, ſuch collections as afterwards occur ought not to be conſidered as conſtituting a ſimple hydrocele; and if, upon evacuating the water by inciſion, the teſtis, beſides being enlarged, is found in a hardened ſtate, and eſpecially if it is attended with pain, and is ulcerated on the ſurface, extirpation ought undoubtedly to be adviſed immediately: And, on the contrary, when the water of a hydrocele is known to have been collected while the teſticle remained ſound and of its natural ſize, whatever enlargement it may be found to have acquired on laying the ſac open, if the teſtis is neither of a ſcirrhous hardneſs, nor attended with pain or ulceration, we ought unqueſtionably to proceed as in a caſe of ſimple hydrocele; as any enlargement of this kind will be rarely found to occaſion future uneaſineſs, and conſequently will ſeldom or never render extirpation neceſſary.

In forming a prognoſis of this diſorder, different circumſtances are to be attended to; the age, and habit of body, of the patient; the duration of the diſeaſe, and the ſtate it is in at the time.

Thus, whatever treatment is to be adopted, more ſucceſs may be reaſonably expected in a young healthy conſtitution than in the reverſe; particularly if extirpation of the teſtis is to be adviſed. In the former, the chance of ſucceſs from the operation is commonly conſiderable, provided the diſorder is not too far advanced; whereas in old, infirm people; and in habits attended with pale, wan complexions; with indigeſtion; and other ſymptoms of obſtructed viſcera; whatever ſtate the diſeaſe may be in, little or no advantage can be expected to accrue from any operation.

With reſpect to the duration of the diſeaſe, if it has already ſubſiſted for a conſiderable length of time without making much progreſs, there will be great reaſon to think that it is of a mild nature; and that the ſyſtem, in general, is not ſo much affected by it as if its progreſs had been great and rapid; and laſtly, the ſtate of the diſorder for the time is of much importance in forming an opinion of its final event. So long as the teſticle remains only ſomewhat hard and enlarged, without the formation of matter, and without any diſeaſe of the cord, if the conſtitution is otherwiſe healthy, there will be much reaſon to expect a favourable event from any operation that ought to take place.

But, on the contrary, when the diſorder is ſo far advanced as to have collections of matter formed, either upon the ſurface of the teſticle, or in its more internal parts; as in that ſtate the conſtitution will probably have ſuffered from abſorption, ſo there is leſs chance of the operation in theſe circumſtances proving ſo ſucceſsful as in the more early period of the complaint: And this is ſtill more remarkably the caſe when the tumor has become ulcerated externally; for we know well, that in all ſuch caſes, the ſyſtem is much more apt to ſuffer from abſorbed matter on the parts being laid open, than while they remained excluded from the external air.

In whatever ſtate, however, the tumor may be, there is always reaſon to expect more ſucceſs from the operation while the ſpermatic cord is yet ſound, than when it has become much diſeaſed; for, ſo ſoon as the cord is materially affected, the chance of ſucceſs from any means to be attempted is always proportionally leſſened. The cord, indeed, may towards its under extremity be diſeaſed, even in the ſame manner with the teſtis itſelf, without influencing the chance to be expected from the operation; but whenever the diſorder has ſpread ſo far up the ſpermatic proceſs as to render it doubtful whether the parts affected can be all removed by the knife or not, and eſpecially when it is once rendered clear that the cord is diſeaſed within the boundaries of the abdomen, inſtead of there being in ſuch circumſtances any advantage to be expected from the operation, every attempt towards the removal of the parts below, will for certain tend to aggravate every ſymptom, and will be a means therefore of forwarding the patient's death.

Whenever a ſcirrhous or cancerous tumor is ſo ſituated as to render its total removal by the knife quite practicable, it ought always to be done; but when the diſeaſe has advanced ſo far as to render this impoſſible, in whatever part of the body it may be ſituated, no attempt of this kind ought to be made, the fact being now clearly aſcertained, of cancerous affections being always rendered worſe by extirpation, when all the diſeaſed parts cannot be removed.

It is of much importance, however, to obſerve, that the ſpermatic cord is in this diſorder frequently affected with a fulneſs and thickneſs of its parts, produced merely by the weight of the tumor, without being in any other reſpect diſeaſed. A fulneſs of this kind, when no pain occurs in the cord itſelf, and when there are no knots or inequalities upon its ſurface, ought never to prevent the operation, when in other reſpects it is rendered neceſſary; as a mere enlargement of it very frequently occurs, either from a varicoſe ſtate of the veſſels, or from a watery depoſition in the cellular ſubſtance of the part, when the proceſs is not in any other manner diſeaſed *. But on the contrary, when the cord, at the ſame time that it has become conſiderably enlarged, hard, and knotty, adheres to the neighbouring parts, is painful to the touch, and eſpecially if it is already ulcerated; theſe, if the diſorder extends over the whole proceſs up to the abdominal muſcles, are circumſtances which, with every prudent practitioner, will at all times put a ſtop to the operation of caſtration.

It has indeed been propoſed, in ſuch a ſtate of the cord, to enlarge the opening in the external oblique muſcle, ſo as by diſſection to trace the diſeaſed parts even into the

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* Of what is here inculcated we have ſome ſingular proofs in Mr Pott's Collections of Caſes, which we have ſo often referred to as a depoſitary of uſeful facts. See Caſes xxxix. xl. xlix. and l. Treatiſe on the Hydrocele.

the cavity of the abdomen, with a view to extirpate them entirely. But however theoretical writers may be amuſed with ſuch propoſals, they will never be ſeriouſly thought of by practitioners, whoſe opportunities for obſervation enable them to think and act for themſelves.

We do not think it neceſſary to ſay any thing, either of the effect of internal medicines, or of external applications, in the removal of this diſeaſe; for in the real ſarcocele, or ſcirrhous teſticle, no remedy with which we are acquainted has any kind of influence. Even cicuta, the powers of which are ſo much extolled, does not appear to be in any degree uſeful, either in carrying off the diſorder entirely, or in mitigating any of its ſymptoms. The only remedy, therefore, from which we at preſent reaſonably expect any advantage, is the removal of the diſeaſed parts by extirpation; ſo that the moſt important matter to be here determined, is that period of the diſeaſe in which the operation is moſt adviſable.

We have already obſerved, that caſes of

ſcirrhous teſticle do now and then occur with which patients go about for a great length of time with little or no inconvenience: Such inſtances, however, are exceedingly rare; for, by much the greateſt proportion of all ſuch affections, prove to be of a dangerous malignant nature.

With reſpect to this point, therefore, we may ſhortly determine, that, whenever a ſcirrhous or hardened ſtate of the teſticle does not yield to the means commonly employed, ſuch as moderate evacuations of blood when theſe are indicated; a ſoft eaſy diet; a lax belly; the uſe of a ſuſpenſory bandage; and eſpecially when mercury, which, on the chance of the diſorder being venereal, is very commonly tried, are all uſed without any effect; we may in ſuch circumſtances always have great cauſe to ſuſpect that the diſeaſe is of a real bad nature; and when to this is joined an acceſſion of more inveterate ſymptoms, and if the diſorder, from the ſtate of an indolent hard tumor, becomes painful, and is evidently going on to acquire an additional bulk, no farther delay ought then to be adviſed: For however improper it would be to remove a hardened teſtis, which for a conſiderable time had remained indolent, without pain or any increaſe in bulk, yet it would be equally unpardonable in any practitioner to inculcate a delay of the operation when matters are ſo far changed that the tumor is become painful, and is daily becoming larger. In ſuch circumſtances, the ſooner the diſeaſed parts are removed, the greater will be the chance of a recovery, and not a day therefore ſhould be loſt. For whatever may have been the opinion of a few individuals on this point, it has long been a fixed maxim with the moſt experienced ſurgeons, that, in all ſcirrhous or cancerous affections, the riſk of a relapſe after the operation, is commonly in proportion to the longer or ſhorter duration of the original diſeaſe *.

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* The opinion of the late Mr Sharpe on this point was ſingular in a man of ſuch extenſive experience. He conſidered the riſk of a relapſe after extirpation in cancerous tumors to be greater in the more early periods of theſe diſeaſes, than in their more advanced ſtates. *Critical Inquiry*, 4th edit. p. 108.

The extirpation of the teſticle being at laſt determined upon, the method of performing the operation is this: The patient muſt be placed in a horizontal poſture on a table of a convenient height, with his legs hanging down, which ought to be firmly ſecured by an aſſiſtant on each ſide. The parts being previouſly ſhaved, if the tumor is very large, an aſſiſtant muſt be employed to ſecure it properly; if only, however, of a moderate ſize, it is better for the ſurgeon to do it himſelf. With one hand, therefore, he ought to graſp the ſwelling ſo as to keep it firm, and with a ſcalpel in the other ſhould make an inciſion along the whole courſe of the tumor, beginning at leaſt an inch above the part where the cord is to be cut, and continuing it through the ſkin and cellular ſubſtance to the inferior point of the ſcrotum. The eaſieſt method of doing this, we may obſerve, both for the ſurgeon and patient, is by one continued ſtroke of the knife; as it is both more quickly and more neatly performed in this manner, than in the uſual way of pinching up the ſkin between the finger and thumb before cutting it; and there is no kind of difficulty or riſk in doing it in the manner we have here directed.

The ſpermatic cord being thus laid bare, the ſurgeon is now with the finger and thumb of one hand to endeavour to ſeparate the ſpermatic arteries and veins from the *vas deferens*; which, as it is commonly eaſily done, ought never, when it is ſo, to be omitted, as it is in no degree neceſſary to include it in the ligature: And this being done, a firm, waxed, flat cord, compoſed of a number of ſmall threads, is, by means of the curved needle, Plate V. fig. 4. to be carried round the blood-veſſels, which are thus to be ſecured by a running knot about a quarter of an inch above that part of the cord which is to be divided.

The cord being at this part cut acroſs, the teſticle is then to be entirely removed by diſſecting the cord and it from above downwards, ſo as to ſeparate them as eaſily as poſſible from the ſurrounding parts.

Different contrivances have been propoſed for facilitating the ſeparation of the teſtis from the contiguous parts; but no invention with which we are acquainted anſwers this purpoſe ſo well as a ſcalpel.

On the diſeaſed parts being all removed, the knot upon the cord ſhould be untied, in order to diſcover the ſpermatic artery and vein, which by means of the tenaculum may generally be ſeparated from the nerve with which they are in contact; and whenever this can be done, they ought unqueſtionably to be ſecured in this manner; for, by including the nerve, no advantage whatever is obtained, and it always renders this a very painful part of the operation. I have ſeen more pain, indeed, complained of in tying the ſpermatic cord in the uſual way, than I was ever witneſs to in any part of almoſt any operation: ſo that whenever the nerve can be ſeparated from the other parts, as it very commonly with a little attention may be, it ought always to be avoided by the ligature*.

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* *Vide* Chirurgical Caſes and Obſervations, by Mr Bromfield, Vol. I. p. 336.

When it ſo happens, however, that this cannot be done, the ligature muſt then be applied in the ordinary manner, and be made to ſurround the blood-veſſels and nerves indiſcriminately; care being taken to make no more preſſure with the knot than is juſt neceſſary for preventing any diſcharge of blood.

We have deſired, that in ſecuring the divided blood-veſſels, both the artery and veins ought to be tied; for if the veins are not included in the ligature, a good deal of blood may be diſcharged from them, as they have not here ſuch a ſupply of valves as the veins of other parts of the body.

The cord paſſed at the upper part of the proceſs is to be left entirely looſe, and to ſerve only as a tourniquet for ſecuring the blood-veſſels more readily in caſe the ligatures paſſed upon them ſhould accidentally ſlip. There is in fact no more neceſſity for allowing this ligature to remain tied, than there is for leaving a tourniquet firmly applied upon any of the extremities after the operation of amputation; and yet, inſtead of one ligature of this kind, it has been the practice with many to apply two, one at the diſtance of half an inch or ſo from the other, by way of very great ſecurity; and theſe they leave firmly tied upon the whole ſubſtance of the cord during the cure of the ſore *.

There is, however, no kind of neceſſity for this precaution, as all manner of riſk may be entirely prevented by ſecuring the blood-veſſels in the manner we have here directed. I have often done the operation in this way, and I never ſaw any inconvenience to proceed from it. By leaving the ligature at the upper part of the wound untied, it may be made uſe of to compreſs the cord in the event of the blood-veſſels burſting out again: But when the operation is properly done, this is an occurrence that will be very ſeldom met with; and at any rate, when it does unfortunately happen, it may be always prevented from producing much miſchief

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* Even the late Mr Sharpe gives theſe directions. *Treatiſe on the Operations of Surgery*, 10th edit. p. 55.

miſchief by the ligature left for that purpoſe, and which may with ſafety be removed at the ſecond or third dreſſing of the ſore.

In making the ligature of the blood-veſſels at the extremity of the cord, if it is neceſſary to divide the proceſs near to the abdominal muſcles, as there is a poſſibility of its retracting for a ſmall ſpace ſo as to get in within the ring, the ligature ought to be cut of ſuch a length as to admit of this; a few inches of it, therefore, ſhould be always left hanging over the ſore, ſo that it may be pulled away at a proper time, in the event of any retraction of the cord. But we may here obſerve, that this retraction of the cord never happens, when the cord has not been too much ſeparated from the ſurrounding parts in endeavouring to introduce the ligature below it. Indeed, no farther ſeparation ſhould be attempted than merely to raiſe the cord ſo far as to get the point of the needle introduced between it and the bone.

In proſecuting the removal of the teſticle, the ſcrotal artery is neceſſarily divided, and it is ſometimes of ſuch a ſize as to diſcharge a great deal of blood; in which caſe it ſhould always, before going farther, be ſecured by a ligature.

The parts being all removed, and the different blood-veſſels all ſecured as we have here directed, a quantity of ſoft lint ſhould be gently laid into the bottom of the ſore; and a compreſs of linen being applied over it, the whole ſhould be ſecured either with the T-bandage, or with the ſuſpenſory bag uſually employed in affections of the ſcrotum. The patient being now laid to reſt, and an opiate adminiſtered, the ſore ought not to be touched till a free ſuppuration takes place, which will commonly be about the fifth or ſixth day; and then the dreſſings ſhould be removed, and ought to be renewed from time to time, once every two days or oftener, according as the quantity of matter renders it neceſſary. Now and then, after this operation, the patient complains of much pain in the ſore, and of tenſion and uneaſineſs in the belly; in which event, warm fomentations ſhould be applied to the abdomen, and the ſore itſelf ſhould be covered with an emollient poultice, to be repeated as often as may be neceſſary.

In deſcribing the manner of performing this operation, we ſuppoſe it to be done in a caſe where the teſticle has not arrived at any great bulk: In ſuch a ſituation there is never any good reaſon for removing any part of the ſcrotum, as has been commonly adviſed *; for, if the teguments are not diſeaſed, or rendered very thin by being much overſtretched, they always recover their tone very ſoon, and ſhould not therefore be removed.

But, when the ſkin has become very thin and inflamed, and eſpecially if any of it is actually in a ſtate of ulceration, all ſuch parts of it ought to be removed along with the teſticle. In ſuch circumſtances, the beſt method of doing it is this: Inſtead of a longitudinal inciſion along the courſe of the teſticle, the firſt inciſion ought to be carried in a ſtraight line to the under

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* Mr Sharpe in ſuch caſes adviſes a portion of the ſcrotum always to be removed, p. 55. *loc. cit.*

under extremity of the ſpermatic cord; from whence two ſemilunar inciſions ought to be continued to the under part of the ſcrotum, and ſhould be made to include all the parts of the ſkin that are in any degree diſeaſed.

In this ſituation the remainder of the operation ought to be exactly the ſame as we have already deſcribed: The ſkin included by the two ſemilunar cuts is not to be diſſected off, but ought to be removed at once with the diſeaſed teſticle.

CHAP. X.

Of the Diſeaſes of the PENIS.

SECTION I.

Of the Phymoſis.

THE glans penis is naturally provided with a covering termed the *prepu-*

tium; formed by an elongation and doubling of the ſkin. This in a healthy ſtate is in general of ſuch dimenſions as to paſs eaſily over the glans, but by diſeaſe it is frequently prevented from doing ſo; and when the prepuce has got forward, and cannot be drawn back over the glans, the diſeaſe thereby produced is termed a *phymoſis.*

This complaint is induced by whatever tends to ſwell the glans, or to excite inflammation and ſtricture in the preputium; and in ſome people, the prepuce is ſo tight, as to render them liable to complaints of this nature from very trifling cauſes. An exſudation of a whitiſh, viſcid matter between the prepuce and glans is natural to many; and the diſeaſe now under conſideration, is frequently the conſequence of want of cleanlineſs, by which this matter is allowed to reſt till it becomes acrid: But the moſt frequent cauſe of it undoubtedly is, the application of the venereal virus to theſe parts, by venereal intercourſes with diſeaſed women.

In ſlight affections of this kind, eſpecially when the diſorder has not been of long continuance, fomenting the parts frequently in any warm emollient decoction, commonly gives relief, or what anſwers perhaps better for ſuch purpoſes than any decoction, is warm milk; this, together with the uſe of emollient poultices, with a a view to relax the conſtricted preputium, will often anſwer ſo effectually as to render any other application unneceſſary.

At the ſame time that fomentations and poultices are applying in this manner externally, part of the fomentation ought to be injected from time to time by means of a ſyringe between the prepuce and glans, in order to waſh away any matter, either of concealed chancres, or that may be produced merely by the inflammatory affection of the part.

When the parts are much inflamed, blood-letting often proves ſerviceable: When the ſuperficial veins of the penis can be opened, any blood to be diſcharged ſhould be taken from one of them by the lancet;

but when they do not appear conſpicuous, diſcharging it from the arm will anſwer as well as from any other part: Local blood-letting by means of leeches would be here particularly indicated; but when the diſorder has originated from a venereal taint, the bites produced by theſe animals almoſt conſtantly terminate in troubleſome ſores. Together with a diſcharge of blood proportioned to the ſtrength of the patient, gentle laxatives ſhould be preſcribed, a low diet, and abſtinence from exerciſe.

When, however, it is found that even a due perſeverance in theſe means has no influence in removing the diſorder, and eſpecially if chancres are confined under the prepuce, which might injure the glans by the matter diſcharged from them not getting a proper vent, in that caſe it becomes neceſſary to remove the ſtricture by an inciſion carried along the whole courſe of the preputium.

As the ſkin of the prepuce is exceedingly lax, it is almoſt impoſſible to cut it with neatneſs and accuracy in the ordinary way, either by a ſcalpel or biſtoury; and when done in this manner, the ſkin yields ſo much before the inſtrument, as always to render it a very tedious and painful operation: Neither are the probe-ſciſſars well calculated for doing it properly, as the parts are commonly ſo thick as to be much bruiſed by the blades of the inſtrument.

Theſe inconveniences in this operation being exceedingly obvious, many inventions have been propoſed for effecting it more eaſily. In Plate XI. is repreſented an inſtrument which I had made for this purpoſe ſeveral years ago, and it anſwers the intention very effectually and with much eaſe.

It conſiſts of a director with a ſmall curve at its extremity, to which a ſharp-pointed biſtoury, with a very narrow blade, is ſo exactly adapted, as to have the cutting part of it entirely concealed in the groove of the director, which ought to be about a quarter of an inch longer than the blade of the knife.

The knife being inſerted into the direc-

Plate XI.

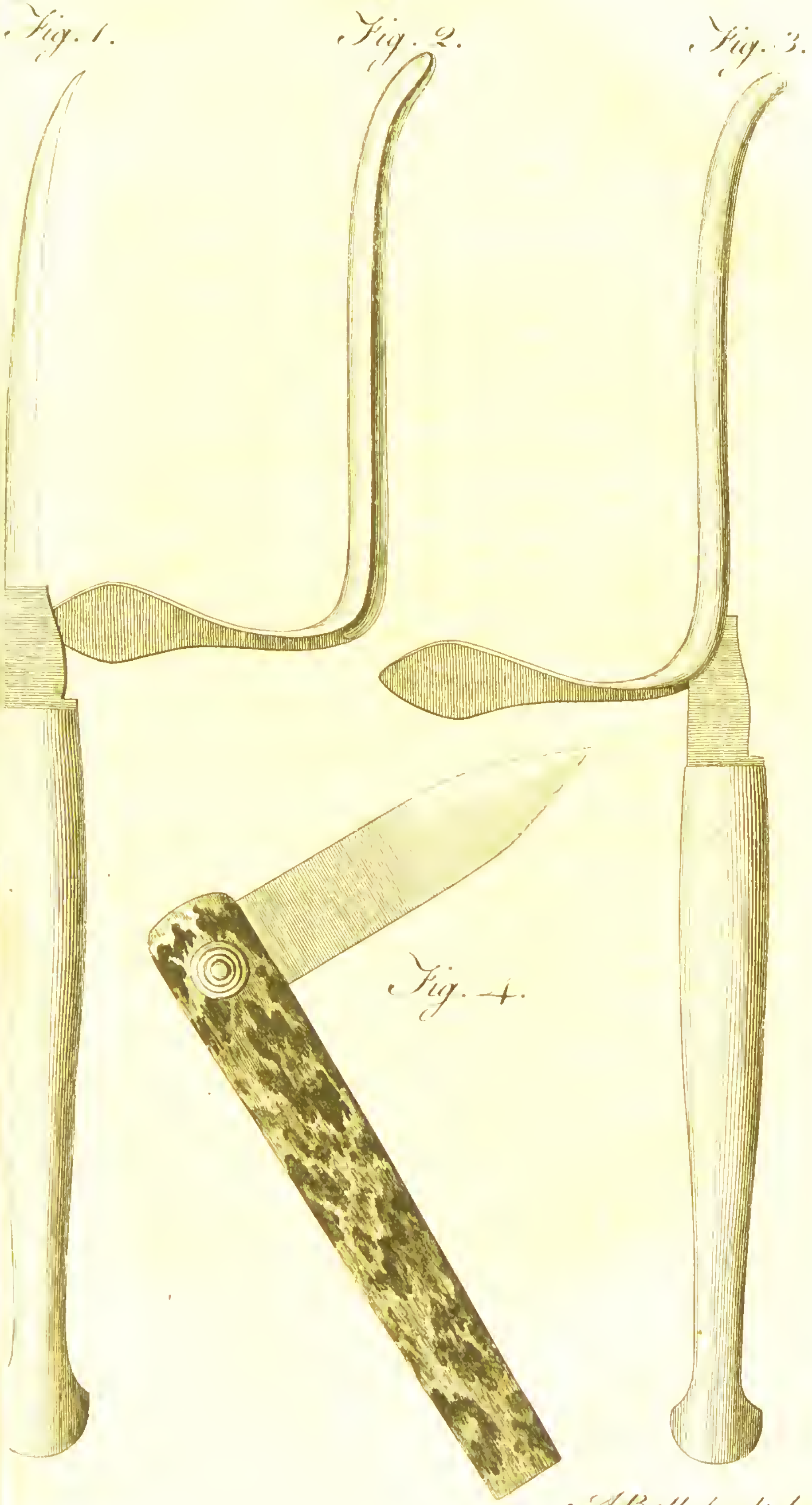
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.

A Bell Sculpt

tor ſo as to be concealed by it entirely, the inſtrument in this ſtate is to be inſinuated between the prepuce and glans on one ſide of the penis, till the director is found by the finger to have reached the upper end of the preputium. The operator is now to keep the director firm with one hand, and with the other is to puſh the knife forward, ſo as to make its point paſs through the prepuce; and the director being withdrawn, the operation is finiſhed by drawing the knife forward ſo as to make it divide the prepuce through its whole length along the ſide of the penis.

In this manner the preputium is preſerved in a tenſe ſtate while the diviſion is going on, by which means the operation is very eaſily accompliſhed: And by making this diviſion on the ſide of the penis, the large veins of the part are avoided, which they could ſcarcely be if the operation was done in the back part of it.

The prepuce being thus divided, the parts below ought to be bathed with warm water ſo as to waſh off effectually any acrid matter with which they may be covered; and this being done, the ſore ſhould be covered with a bit of ſoft lint; and a compreſs of old linen being laid over it, the whole may be very effectually retained by a ſmall linen bag adapted to the ſize of the penis, to be ſecured by two ſtraps being pinned to a circular bandage made to ſurround the body. This bag muſt indeed be always removed when the patient makes water; but this is eaſily done; and it retains the dreſſings, not only more effectually, but with more eaſe to the patient, than is ever done either with adheſive plaſters or any other form of bandage.

In the after dreſſings of the ſore, care ſhould be taken to inſert a piece of ſoft lint between the divided prepuce and glans, otherwiſe troubleſome adheſions are apt to occur between them: I have met with ſeveral inſtances of this kind, which gave much diſtreſs to the patients, and which by a little nicety and attention in dreſſing the ſores might very eaſily have been prevented.

It is ſcarcely neceſſary to obſerve, that when any venereal infection ſubſiſts in the conſtitution, the ſore produced by this operation, will not readily heal if the patient is not put under a proper mercurial courſe. In ſuch circumſtances therefore, if mercury has not been previouſly preſcribed, it ought always to be done, immediately on the operation taking place.

In ſome caſes of phymoſis, the preputium is found to be ſo very long, that inſtead of dividing it longitudinally, the operation of circumciſion anſwers the purpoſe better; and it is very eaſily effected, by taking away ſuch a portion as may appear requiſite of the whole circumference of the prepuce. In ſuch circumſtances, when the prepuce is naturally too long, the removal of a quarter or half an inch of it often frees the patient from what even before the approach of this diſeaſe he had found to be inconvenient; and as the removal of the extremity of the prepuce in general admits the remainder to retract eaſily, the operation is accordingly now and then performed in this manner.

SECTION II.

Of the Paraphymoſis.

BY the term *Paraphymoſis* is meant a morbid retraction of the preputium, producing ſtricture behind the glans penis. This diſeaſe, like the former, is induced moſt frequently by a venereal taint; but it will ariſe from whatever tends to produce, either a preternatural fulneſs in the glans, or a conſtriction of the prepuce; and more eſpecially from ſuch cauſes as effect a complication of both.

In the incipient ſtate of this diſorder, by a little attention and dexterity, the prepuce may be ſometimes brought over the glans, by the ſurgeon puſhing the glans gently back with both his thumbs, while his fingers are at the ſame time employed in moving the prepuce eaſily forward. In the more advanced ſtate of the diſeaſe, however, no attempt of this kind ought to be made, as it is in the commencement of it only that it is ever known to ſucceed; and when it does not prove uſeful, it runs a riſk of doing harm, by inducing an increaſed degree of irritation in the parts to which the preſſure is applied.

As the paraphymoſis ſeems evidently to be more frequently induced by an enlargement of the glans than by any original affection of the prepuce, ſo the ſtricture in the latter is not here ſo effectually relieved by warm fomentations, as it commonly is in the phymoſis, where the diſorder is moſt frequently produced by an affection of the prepuce itſelf. In the paraphymoſis, indeed, I have often ſeen much harm done by applications of this kind; as they evidently tend to produce an increaſe in the ſwelling of the glans, by which the ſtricture in the prepuce is always proportionally increaſed.

Nothing in general anſwers ſo well here as the ſaturnine applications. Such ſwellings, indeed, will often ſubſide by being frequently immerſed in a cold ſolution of ſaccharum ſaturni, when no other remedy has any influence. But, when the penis is evidently much ſwelled and inflamed, together with this application to the part, the patient ought to be kept cool, gentle laxatives ſhould be preſcribed, and diſcharging blood from one of the ſuperficial veins of the penis is ſometimes of uſe.

By a due continuation of theſe means, and by keeping the patient on a low diet, this diſorder will moſt frequently be removed: But when, notwithſtanding the uſe of theſe remedies, the diſeaſe proceeds to increaſe, by the ſwelling in the glans becoming more conſiderable, and the ſtricture of the prepuce increaſing, an œdematous ſwelling begins to appear in the latter, which on ſome occaſions acquires a conſiderable degree of magnitude; and unleſs relief is now obtained by a complete removal of the ſtricture, mortification of the glans itſelf is very apt to occur.

When, therefore, none of the remedies we have recommended, prove effectual in preventing this ſtage of the diſorder, we are now to attempt to remove the ſtricture by an operation; and the eaſieſt method of performing this, is, with the ſhoulder of a lancet to make a deep ſcarification on each ſide of the penis, directly behind the glans; taking care to make each cut of about half an inch in length, and of ſuch a depth as effectually to divide the prepuce juſt at its termination.

The parts ought now to be allowed to bleed freely, as this circumſtance of itſelf in general affords immediate relief; and ſo ſoon as the hæmorrhagy ſtops, a pledgit of any emollient ointment being applied to the ſores, and a ſoft well-made poultice being laid over the whole, if the ſcarifications have been carried entirely through the ſtricture, nothing farther will in general be neceſſary than dreſſing the parts daily with the ſame ointment they were at firſt covered with: But, if they have not been made of a proper depth, it will be afterwards neceſſary to renew them, when care muſt be taken to do the buſineſs effectually.

In the phymoſis, it was recommended to put the patient under a mercurial courſe whenever there is the leaſt reaſon to ſuſpect that any venereal taint ſubſiſts in the conſtitution; and the ſame precaution, it is evident, muſt be equally proper in caſes of paraphymoſis.

SECTION III.

Of Amputation of the Penis, &c.

THE penis, like other parts of the body, is liable to diſorders, which render it neceſſary to remove the parts affected by amputation.

Thus we know, that on ſome occaſions the penis is ſeized with mortification, and it is frequently attacked with ſores of the cancerous kind: And when mortification has been induced either by a neglected paraphymoſis or from any other cauſe, it becomes neceſſary to remove the diſeaſed parts; as is the caſe when any part of the penis is ſeized with a cancerous ſore, which, inſtead of healing by the means regularly employed for its removal, proceeds to turn worſe.

We have elſewhere entered fully into the conſideration both of cancerous diſorders and of mortification *. To what was then ſaid reſpecting the treatment of theſe affections we muſt now refer, and ſhall at preſent attend only to the operation of amputating the penis whenever it has become ſo diſeaſed as to render this neceſſary.

A circular inciſion ought to be firſt made through the ſound ſkin at the fartheſt extremity of the ſore, and the ſkin ſhould be then drawn back by an aſſiſtant; when the body of the penis ſhould be cut through by one ſtroke of the ſcalpel, care being taken to remove every part that appears to be in any degree diſeaſed.

This being done, ſuch arteries as bleed freely ought to be carefully ſearched for, and ought by all means to be ſecured by ligature. In general, two, and ſometimes three branches of an artery will be met with, which ought to be ſecured in this manner. But even after the principal arteries have been tied, a conſiderable ooz-ing

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* *Vide* Treatiſe on the Theory and Management of Ulcers, &c.

ing of blood always occurs from the ſurface of the ſore, which the ſprinkling with ſtarch or gum arabic in fine powder will ſometimes command; but when this does not anſwer, a ſmall ſilver canula being introduced into the urethra, and retained there by a proper bandage, any farther diſcharge of blood may be then very eaſily ſtopt by a ſlight compreſſion made with a narrow roller upon the remaining parts. A very ſlight compreſſion anſwers the purpoſe, ſuch a degree of it indeed as has no influence in hurting the parts on which it is made; and as there is no neceſſity for the tube inſerted into the urethra being of a great length, it is eaſily retained during the whole cure without being productive of much inconvenience.

In Plate IX. fig. 4. is repreſented a tube which I have on different occaſions uſed for this purpoſe. *A.* the tube itſelf; *B. B.* two ligatures for connecting the tube to a bandage paſſed round the patient's body.

Heiſter and ſome other authors, being afraid of the hæmorrhagy produced by amputation of the penis, adviſe it to be done by means of a ligature. A ligature being applied with ſufficient firmneſs a little above the diſeaſed parts, they are thereby made to fall off in the courſe of ſix or eight days; but whenever a part can be removed by the ſcalpel, it is done with much more eaſe and certainty with that inſtrument than by ligature.

Others, again, have ſaid, that there is little or no danger to be apprehended from any diſcharge of blood that can ever occur here; but this I know from experience is far from being the caſe. In the courſe of one ſeaſon, I had occaſion to perform this operation three different times in the Royal Infirmary here; and in the firſt I was perſuaded by a gentleman who had found it in one caſe to ſucceed, not to ſecure the arteries by ligatures, but to truſt entirely to compreſſion. This was accordingly done; but unfortunately, in the courſe of an hour or two after the operation, ſuch a profuſe hæmorrhagy ſupervened as terminated in the patient's death.

In the next that occurred I was reſolved to ſecure every branch of an artery that could be laid hold of. Three different arteries were accordingly tied, and no hæmorrhagy occurred. In the third operation two branches of an artery were ſecured; but a plentiful oozing ſtill continuing from the ſore, the ſilver tube abovementioned was introduced into the urethra, and a ſlight compreſſion being made upon it, the hæmorrhagy was thereby effectually ſtopt.

When any arteries that appear have been ſecured in the manner directed, the parts ought to be covered with pieces of ſoft lint ſprinkled with ſtarch or gum arabic in powder; and a compreſs of linen, with a hole in it large enough to paſs over the canula in the urethra, being laid over the whole, and the T-bandage being employed to retain it, all the dreſſings may in this manner be effectually ſecured. And the after treatment of the ſore ought to be ſimilar to that of wounds of any other part.

In proceeding to this operation it ought to be kept in view, that the prepuce is frequently ſo much enlarged and ulcerated, as to give cauſe to ſuſpect the glans and other parts below to be much diſeaſed, when in reality they are perfectly ſound. I once ſaw an inſtance of this, where the appearances previous to the operation were ſuch as gave no reaſon to doubt of the glans being affected; and the prepuce with part of the penis were accordingly taken off, when it afterwards appeared that the glans might have been ſaved, as the diſeaſe was found to be entirely confined to the prepuce.

In every caſe, therefore, where there is not an abſolute certainty of the glans being affected, all the diſeaſed prepuce ſhould be firſt removed; and the ſtate of the parts below being examined, if they are found to be ſo much affected as to render amputation neceſſary, this can be then done with as much eaſe as if they had been taken off along with the prepuce; and on the contrary, if they are diſcovered to be ſound, both the ſurgeon and patient will have much cauſe to rejoice.

It ſometimes happens, that the frenum of the penis is ſo ſhort as to create a good deal of uneaſineſs to the parts when in a ſtate of erection. But as there is no danger to be dreaded from a diviſion of this ligament, whenever it proves troubleſome it may with great ſafety be cut acroſs; and it is very eaſily done with a pair of probe-pointed ſciſſars: After the frenum is fairly divided, a bit of ſoft lint ought to be inſerted between the lips of the wound, otherwiſe the parts newly ſeparated will be apt to re-unite immediately.

On ſome occaſions, the urethra in male children is found to be incomplete, by terminating before it reaches the extremity of the yard. Now and then it does ſo without any external opening, and at other times it terminates by a ſmall orifice at ſome diſtance from the end of the penis.

When no opening is diſcovered outwardly, if the urine is found to ſtop at any particular part, the introduction of a ſmall trocar from the point of the yard along the courſe that the urethra ought to take, and carrying it forward till it meets with the urine, will always afford immediate relief; and by the uſe of ſmall bougies the ſides of the paſſage may be rendered callous, and a clear opening be thus preſerved. But when any opening is diſcovered, although it ſhould not be properly placed, yet if it affords a temporary paſſage to the urine, it is better to delay the operation till the patient is ſomewhat advanced in life; and on an opening being then made with a trocar in the manner we have mentioned, a piece of flexible catheter may be introduced, not only for preſerving the paſſage free and pervious, but for carrying off the water till a cure is obtained. In the earlier periods of childhood, the ſmallneſs of parts through which it ought to paſs, renders the flexible catheter altogether inadmiſſible.

Independent of theſe affections of the penis which we have been juſt conſidering, fiſtulous openings frequently occur in the urethra, and they are always productive of much diſtreſs. Theſe we ſhall attend to when we come to treat of the Fiſtula in Ano and Perinæo; and the treatment of Stones impacted in the Urethra, will fall to be conſidered under the operation of Lithotomy.

EXPLANATION *of* PLATE X.

Fig. 1. A trocar of a proper ſize for evacuating the contents of an encyſted hydrocele. By the flatneſs of its form, and its point being of the lancet kind, this inſtrument penetrates the cyſt with great eaſe; and can thereby be uſed with more ſafety than the ordinary form of this inſtrument.

The point of the perforator is commonly made much longer than is neceſſary. It ought not to paſs more than the fifth or ſixth part of an inch from the extremity of the canula; of this length it anſwers equally well as when the point is longer, and it is not ſo apt to wound the teſtis on being introduced into the cavity of the tunica vaginalis.

Fig. 2. A trocar, the invention of Mr André. Fig. 3. The canula of this inſtrument, formed of two hollow plates of elaſtic ſteel, firmly united together at their larger extremities by two ſcrew-nails. The tube formed by theſe two hollow plates is of ſuch a ſize as to allow the perforator, fig. 4. being puſhed into it with very little force; and the elaſticity of the plates, which admits of their yielding to this paſſage of the perforator, enables them to return inſtantly to form the ſame ſize of tube, ſo ſoon as the large extremity of the inſtrument *A* has fairly paſſed the extremity of the plates.

The point of the perforator with a ſmall portion of the extremity of the tube being puſhed into the vaginal coat, the perforator is to be then withdrawn, which when the inſtrument is properly made may be done without much force.

The advantage which this inſtrument is

ſuppoſed to have over any trocar of a different form, is, that the point of the perforator making a larger opening than is juſt neceſſary for the paſſage of the canula, the latter is thereby made to enter with more eaſe than it does in the uſual form of the inſtrument.

But although this invention of Mr André's is neat and ingenious, it does not appear to be very neceſſary; for, when the other form of inſtrument is well finiſhed, and the ſilver at the extremity of the canula is made very thin and properly fitted to the perforator, it enters with a great deal of eaſe. The canula of Mr André's inſtrument has this diſadvantage too, that by being made of fine poliſhed ſteel, it is almoſt impoſſible to render it ſo dry after every time it is uſed, as to prevent it from ſuffering with ruſt, at the part where the two plates are fixed together by the ſcrew-nails.

EXPLANATION *of* PLATE XI.

Fig. 1. and 2. Different parts of an inſtrument deſcribed p. 530, for performing the operation of the phymoſis.

Fig. 3. The two parts of the inſtrument connected, and ready for uſe.

Fig. 4. A large impoſthume lancet.

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